

UNIVERSITY OF CALIFORNIA
LOS ANGELES

RECREATIONS

IN

AGRICULTURE, NATURAL-HISTORY, ARTS,

AND

MISCELLANEOUS LITERATURE.

BY

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RECREATIONS
IN
AGRICULTURE.

Hints respecting the circumstances that require to be chiefly adverted to in experimental agriculture, particularly with a view to a proposal for instituting a national experimental farm.

Non omnia possumus.

TAKING an extensive view of all the objects that demand the attention of the farmer, they may perhaps admit of being classed under the following general heads.

First, The culture of particular crops, the melioration of particular soils, and the rearing and management of particular animals. This may be called the *practical* department.

Second, The distribution of labour so as to diminish expense, to perfect as well as to facilitate every operation, and to convert the products of the farm to the most beneficial purpose. This may be called the *economical* department.

Third, The selection of those objects for cultivating or rearing, that will, in every case and variety of cir-

circumstances, turn out the most profitable to the farmer and beneficial to the public. This may be called the *physical* department.

Before agriculture can be carried to its highest degree of perfection, every particular respecting each of these departments must be fully known. This, however, is a degree of perfection that no man can seriously hope ever to see attained; but, as something is already known respecting each of these departments, the question for our consideration at present is, what are the attainable measures that would tend the most to promote the advancement of knowledge in each of these departments, and towards which an experimental farm, if such a thing could be established, ought to be chiefly directed? For, although it is impossible in practice to separate these departments so effectually as to keep them entirely distinct from each other, yet it will be found that, if elucidations respecting one of these classes shall be considered as the principal object of experiment, the previous arrangements and general train of operations must be extremely different from what would be required, if the inquiries were chiefly confined to another department; and it is of much consequence that such a plan only should be adopted as the nature of the institution shall be best calculated to effect. To enable the public to form a decisive judgment in regard to this particular, the following remarks are respectfully submitted to their consideration.

No branch of agriculture has been so much adverted to, or has been carried to so much perfection by practical farmers, as those particulars referable to

the *first* department above specified; on which account I have denominated it the *practical* department. Indeed, the business of the farmer, from the beginning of the world till the present time, has been little else than a series of detached experiments on the best modes of cultivating those particular crops that have attracted the special notice of the farmer on his own particular soil, and under the influence of that climate which prevails where he is situated; or of rearing such animals as had come within his reach, upon the food that he has been enabled to provide for them. In this way he has made a much greater diversity of experiments than could be made on any farm that might be established at the public expense in the space of perhaps a thousand years, could it be continued so long. These experiments too have been so often repeated by individuals under all diversities of seasons and climates, as to give a decisive body of useful inductions to practical farmers that could not otherwise have been ever obtained. Experiments, therefore, that are referable to this department, seem to be peculiarly appropriated to the practical farmer only, and do not naturally fall within the sphere of an experimental farm, unless incidentally, and for particular purposes that will come to be afterwards considered.

What is chiefly wanted under this department is, not so much to make new experiments, as to collect and arrange those that have been already made by the most judicious practical farmers every where; and, by comparing these, and adverting to the variations in respect to soil, climate, and other circumstances, to collect a body of practical directions which could

not fail to prove of great national utility, were these directions to be so printed as to fall within the reach of practical farmers every where; for the circumstance that has hitherto retarded the progress of agriculture under this department, is not so much the want of knowledge in it, as the difficulty that has prevailed with respect to the means of diffusing that knowledge among the persons to whom it could prove useful. A farmer is necessarily confined to a narrow spot, and learns only by imitation to follow what has been practised on that spot, without knowing that a practice, perhaps much more perfect than his own, has been long successfully pursued in another district. His views are limited too in regard to the objects that he might successfully rear or cultivate, in regard to all which particulars he might be instructed by means of a publication of the nature here hinted at, especially if accompanied by a few lucid experiments on certain subjects, that will come to be more particularly adverted to below.

With regard to the *second* head, which has been styled the *economical* department of agriculture, it falls so peculiarly within the province of the practical farmer, and it seems to be so impossible to carry it to any degree of perfection by any other stimulus than the hope of gain, which an individual shall have a prospect of deriving from his own exertions, that I should consider every experimental institution that could be formed by a society with this view as entirely chimerical. It is a branch of agriculture, however, which may be considered as yet but in its infant state, owing to the innumerable ill-judged restraints under

whose influence the hands of the farmers have been hitherto bound up in the best parts of this island. When landed gentlemen shall become so far enlightened as to see how much their own interest might be promoted by restoring that freedom to their tenants, the want of which has precluded them from dreaming of many improvements that must precede that ardent attention to small and distant profits, which forms the first link in the chain of economical arrangements, they will then see a progress in agricultural exertions that will astonish them, not less by the generous independence of mind it will inspire into the tenants, than by the liberal supplies with which their own coffers will be filled, without any painful effort on their part to effect it. Then only the importance of this department of agriculture will come to be duly adverted to, and farmers will learn from each other what their superiors can never teach; because to them it must ever be, in a great measure, unknown. Every investigation, therefore, respecting this department, attempted upon an experimental farm, must, I conceive, be extremely imperfect; so that it ought to be considered rather as a collateral and subordinate, than a principal object.

It remains, then, that an experimental farm ought to be chiefly appropriated to the elucidation of questions referable to the *third* class above enumerated. Indeed, these investigations are of a nature so intricate, and require such a painful attention, and such a nice discrimination of circumstances before truth can be attained, as to render it impossible for any individual, in the ordinary pursuit of business, to attempt the

enterprise with a reasonable hope of success. The expense too that must be incurred for procuring the aid of talents capable of directing these investigations, and the hands necessary for executing them with propriety, are such as cannot come within the reach of any individual whose habits of life have been such as to enable him to judge of the great importance of such elucidations; and were that expense to be incurred by a man of high rank, who was incapable of judging accurately in this respect for himself, he would find it so impossible to guard against being imposed upon by the plausible pretexes of designing men, that the money he would be willing to bestow on this enterprise would be worse than thrown away, as it might be perverted to the purpose of disseminating error by means of injudicious experiments inaccurately conducted, instead of elucidating the truth. From the operation of these causes it has happened that, though there are innumerable facts referable to this head of the utmost importance, that require to be clearly ascertained before we can advance a single step with certainty in the progress of agriculture, yet there is not the smallest prospect that ever these facts can be ascertained, unless it shall be done under the influence of an institution of the nature now proposed; and, as it is of the utmost importance that the plan should be well digested at the commencement of the undertaking, and the principles upon which it rests thoroughly understood, so as to admit of its being afterwards prosecuted with a rational steadiness, it seems to be necessary that these principles should now be developed with the utmost possible precision, that they may be

submitted to the subscribers for their full concurrence or rejection before any expense shall have been incurred.

The practical farmers, considered in this point of view, may be compared to an artist, who is furnished with a certain number of materials on which he is at liberty to work, of which he is to make the best use he can. If the materials that are given to him be of a worse kind than others he might have had, his work must be imperfect; or, if the tools he employs, or the manipulation he has been taught are awkward and rude, his work will be defective and expensive compared to what it might have been. If this man shall be obliged to go in quest of raw materials to work upon, instead of taking those which are brought to his hand, he must not only desert his own business for the time, and thus hurt his family, but he may be also greatly imposed upon in regard to the new materials he shall employ, which, though to his eye they shall appear to promise fair, may still upon trial prove extremely defective. Hence it will ever happen that a cautious man in this profession ever must, and ought to be extremely shy to depart from the path he knows, and to deviate into those which, though alluring, may eventually lead him into distressing embarrassments. Are such men, under these circumstances, to be blamed for acting with caution? Or do they act unwisely if they insist that, before they shall adopt any new thing, it shall first be proved by the clearest and most decisive experiments that they cannot possibly be mistaken in regard to its intrinsic qualities? Surely no one has a right to complain of

the obstinacy of these men until he can produce undeniable experiments to prove, with the utmost certainty, that it is impossible there can remain a doubt upon this head? Where, I ask, are such experiments to be found?

To illustrate this position by a parallel case exactly in point. Sir Joshua Reynolds, a painter of great eminence in this island, who aspired at the honour of carrying his art to a degree of perfection it had not as yet attained, instead of contenting himself with working up those colours which the experience of his predecessors had transmitted to him as safe and efficacious, persuaded himself, by speculative reasoning and incomplete trials (in which he stepped out of his own proper line as a painter, to encroach upon the province of the chemist), that he had found some new colours that were much more perfect than any that had been hitherto adopted, and to these he attached himself with avidity; but time, in a few years, discovered his error. The fallacious colours quickly faded: his fondest hopes were thus entirely blasted, and he was at last compelled to return once more to those very colours he had so unadvisedly abandoned.

In this instance Sir Joshua acted precisely the same part as the practical farmer who should unadvisedly abandon what he knows for that which is recommended to him by plausible probabilities only, supported, perhaps, by casual trials imperfectly made, which, though they promise fair at the outset, may, after all, prove fallacious, and to him perhaps ruinous. Before the painter in this instance could proceed with confidence to make use of these materials

in works of value, the quality of these materials should have been ascertained beyond a possibility of doubt, by fair and judicious experimental trials, made under such circumstances as that, if they had failed, that failure could have been attended with no bad consequences to any one. After the colours had been thus proved, they might have been safely put into the hands of the painter, who might then employ them without dread or anxiety, as best suited his own purpose. Such exactly is the case with the practical farmer. It behoves him to adhere steadily to work upon the materials that are already with certainty known, and not to depart from his own province to encroach upon the walk of experimental physics, which is far too intricate for him to pursue without the greatest risk of his deviating into error. To others the task belongs of ascertaining facts of this nature, and to them he ought to leave it: when the facts are clearly ascertained, they may be safely delivered to him as valuable materials on which he may proceed with confidence to work. If there are many such facts that are unascertained, there surely can be no enterprise more praiseworthy than an attempt to perform this necessary task for the public; and that there are many such a very moderate degree of knowledge in the practice of agriculture will fully evince.

It would lead to too great length for our present purpose, were I to attempt even to glance at the facts that require to be ascertained through the whole circle of agricultural investigation; but it may be of use to take a cursory view of some of the leading points, merely to give a clear idea of the importance of the

object proposed, with a view to stimulate those who are desirous of promoting the public good in their efforts to overcome such difficulties as may incidentally occur to retard their progress at times, and to induce them to adopt proper measures to prevent their beneficent design from being frustrated.

One of the first objects that occur to an attentive farmer is the importance of ascertaining, with the most absolute precision, what are the particular crops that he could cultivate with the greatest possible profit, and the individual animals that it would prove the most beneficial for him to sustain on his farm, all the circumstances of soil, situation, climate, amount of capital, and every other particular being duly considered. But he no sooner enters into particulars respecting this grand department of his business, than he finds that, instead of the *certainty* he wishes for, he can meet with nothing but conjectures and opinions, which leave him in doubt and uncertainty to which point soever he turns himself.

Wheat, we shall suppose, is the first crop that attracts his notice, in regard to which he finds that there are two or three kinds usually cultivated in the district in which he is placed, and that some men prefer one kind and some another, without his being able to discover one undeniable fact upon which these different opinions are founded. That one sort has sometimes yielded a greater crop than another on certain soils, in particular seasons, he finds little reason to doubt; but the precise circumstances that occasion these variations, or their amount, he in vain attempts to learn; in short, it is not known. He knows also,

by reading and conversation, that there are many other varieties of wheat which he has never seen, and which most probably have, each of them, some distinctive qualities that might make them more or less eligible in particular circumstances, were these distinctive qualities precisely ascertained; but this he finds has not only not been done, but, from the difficulty attending such an investigation by practical farmers, the benefits that might result from it have been so slightly adverted to by them, that it has scarcely become an object of inquiry. The same thing may be said of the varieties of barley, rye, oats, pease, beans, and every other crop which the farmer cultivates in this climate. To remove the suspicion of unnecessary refinement that may lie against me for stating this unobserved particular so strongly as I now do, it becomes necessary for me to adduce some well authenticated facts under this head, which will establish the utility, if not the necessity, of a particular investigation of the objects referable to this class, subjected to the pure test of experimental accuracy.

No particular crop has attracted so much of the attention of farmers in Scotland, in general, as *oats*. Oatmeal is the food of the greater part of the inhabitants of that country; and the oat can be made to grow on perhaps a greater diversity of soils that have been newly brought under culture especially, and under greater variations in respect to climate, soil, culture, and other circumstances, than any other crop whatever; of course greater occasion has been given in the common practice of husbandry there to remark the peculiarities of the different varieties of oats, when

accidentally sown in the same district, in situations that proved favourable to the one, and unfavourable to the other, than has taken place in regard to any other kind of grain cultivated here; hence it has happened, that the peculiarities of some of the different kinds of oats have been more precisely ascertained than those of other kinds of corn. Without specifying here the other varieties, I shall barely mention two sorts which differ very materially from each other. One of these yields a small thin skinned grain, which weighs very well, and yields a good quantity of meal when thoroughly ripened; it is moderately early, that is to say, it is not so late as some kinds, nor so early as others; it affords a long straw, moderately strong, and will yield a tolerable crop upon land of a very poor quality; but, if it be sown upon rich land, it grows with so much luxuriance, as to run a great risk of lodging and being rotted entirely before it be ripe, should the season prove moist in any degree. This variety is known by the name of the *Blainzlie* oat, from a farm of that name in Berwickshire, where it has been cultivated, without admixture of any other sort, for time immemorial, and from whence it has been gradually diffused over most parts of Scotland.

The other kind of oat ripens at least a fortnight earlier than the former, if sown at the same time in the proper season. It is a plumper and more compact looking grain, and rather more weighty, though the difference in this respect is less than the appearance would indicate. It requires a very rich soil to rear it to the utmost perfection; and the stalk is so strong, and at the same time so short, that it is in no dan-

ger of lodging even upon the richest soil, let the season be what it may; on this account, and because it does not tiller much, double the quantity of seed of this sort may be safely sown than durst be ventured of the other. The ear is short when compared with all other kinds of oat that I have seen, and the foot-stalks are stiff, and stand out from the stalks nearly at right angles. From the circumstances here stated, it generally happens that upon *very rich* land nearly double the quantity of grain could be reaped, if it were sown with Poland oats, for so they are usually called (the name, however, should not be relied on, as other sorts are known by the same name), than could have been obtained from the same land, had it been sown with Blainzlie oats. [There is one instance of twenty-one bolls, three firlots of Poland oats, being reaped from one acre, which is equal to one hundred and thirty bushels Winchester measure; but this is a solitary case; sixteen bolls of this kind of corn (ninety-six bushels) is no uncommon crop. The Scotch acre is to the English as five to four nearly.] On the other hand, were these kinds of corn sown both at the same time upon *poor* land, the case would be just reversed; for the crop of *grain* from the Blainzlie seed would exceed the Polish oat in the proportion of two to one nearly, and the straw would exceed the other in the ratio of four to one at least.

The practical inferences that may be drawn from these facts are obvious; but they are so important, as to deserve to be dwelt upon a little. Should it have so happened that one of these kinds of oat only was known in a particular district, and the other sort only

in another district, it is plain that the farmer in one district must have adopted a practice in regard to the culture of that kind of corn that would have been totally incompatible with that which was found from experience to succeed best in the other. They might thus justly, as they thought, have accused each other of bad management, or even of stating facts falsely; but what is of more importance to be adverted to is, that in neither of these districts could the farmer have derived nearly the same profit from the culture of this crop that he might have done; because, in either case, some part of his land must have yielded a very deficient crop, compared to what it might have done by a judicious adaptation of the crop to the state of his fields.

As the same variations doubtless take place in regard to the varieties of all other kinds of corn, and as these variations are diversified in regard to a vast number of particulars, it must follow, by the same mode of reasoning, that, until all these varieties are fully known, and their specific peculiarities distinctly ascertained, the farmer, to continue our former allusion, must continue to work upon materials that are, in almost every case, much worse adapted for his purpose than others would be which he might attain were they known to him; and thus the general produce of the country must suffer a prodigious abatement from what it might have been, without costing one shilling of additional expense. To ascertain facts of this nature is, therefore, an object of great importance, and falls exactly within the province of an experimental farm.

But the diversity in regard to animals is perhaps still greater than in vegetables, and the distinctive peculiarities of the varieties of each species are certainly less known. This subject, though of infinite consequence to the advancement of agriculture, has indeed scarcely begun to be studied; or, where it has been at all adverted to, it has been under the influence of a train of ideas deduced from false principles, or ill-founded theories of philosophers and naturalists, which serve only to lead to perplexity or error; incontrovertible facts being continually at variance with opinions that have been too hastily admitted as axioms that require no demonstration.

Having lately had occasion to take notice of this circumstance under the head of Natural-history, Vol. I. page 51, there is no occasion to recur to it in this place. It is only necessary here to observe that, before a judicious set of experiments can be made on the subject, it will be necessary first to collect together the facts referable to this head that are already known. As a beginning, I shall enumerate a few of the varieties of our most common domesticated animals in as far as these are yet known, adding a few particulars respecting the canine species to those already specified, not so much because Mr. Buffon has chosen it as the particular class by which to illustrate his theory, as that the varieties belonging to it are more numerous, perhaps more distinctly characterised, and more generally known by man than any other we are acquainted with.

VARIETIES OF THE DOG SPECIES.

THE first particular I shall take notice of as tending to prove that there is a permanent diversity in the varieties of dogs, and that they must have been derived from original distinct parents, and not all sprung from the shepherd's dog, as Buffon contends, is the difference of *size*. Between the smallest lap dog, not much larger than a rat, and the largest mastiff, the difference in point of weight is not less, I should suppose, than as one hundred to one; now it is well known that these two breeds, if carefully guarded from an intermixture with other varieties, can be preserved entire in this climate for ages, each kind without any sensible deviation. We know that there was a favourite breed of dogs nourished by king Charles the Second, which have been propagated ever since under the name of king Charles's dogs, without any sensible deviation in point of size or other circumstances, as can be clearly ascertained by the portraits of these dogs well preserved, compared with the living descendants of that breed every day to be met with; we know also that the large dog, painted by Vandyke in the picture of Charles the First's children, is to be found in all respects the same in the present day as at those times. These two kinds of dogs, if placed together without any intermediate link by which a mongrel breed could be produced, must have remained perhaps for ever distinct, from the mere physical ob-

struction in point of *size* only. Now it will not be alledged that this difference in point of *size* can have been occasioned by luxurious feeding, gradually converting the small into the large species; for it unfortunately happens that in the present case the fact directly contradicts the hypothesis; for no species of dogs in this island are so highly pampered as the small kind here specified, or are in general so fat as they are: yet we see they still retain their diminutive size to the present day; and many are the instances of large dogs sparingly kept, though still they retain the original distinctive size of bone undiminished. These dogs being also bred in the same climate, and kept under nearly an equal state of domestication, affords the clearest proof of the superior influence of *breed*, when compared with that of all other circumstances put together.

Let us next select two other breeds, distinguished by other obvious peculiarities. The greyhound and the spaniel, among other particulars, are clearly distinguished, the one by possessing the faculty of smelling in an eminent degree, and pursuing its game by scent alone; the other, by not distinguishing smells at all, or in so faint a degree only as not to be able to avail itself of that sense in pursuit of game, and is therefore obliged to depend upon its eye alone in the chase: now these two breeds of dogs, possessing each these distinctive characteristics, have been known in this isle almost ever since the earliest records that have been preserved, and this, notwithstanding the perpetual chances of debasement that each domesticated breed obviously runs by means of the promis-

cuous propagation of mongrel breeds; for every person knows that a mongrel greyhound may be bred at pleasure that shall possess a nose (in the technical language of the huntsman) if he chooses, on that account, to have his speed of foot diminished. This, then, affords another decisive proof of the influence of blood over every other circumstance in preserving the varieties of animals.

A curious fact respecting the breeding from domesticated wild animals has been lately brought to light, which, on account of the practical inferences that may be drawn from it, deserves to be generally known. Domesticated elephants have been under the dominion of man for more than two thousand years, and during all that time it has been universally believed, that it was impossible to make them breed while in a tame state; nor was there a single instance upon record of this having taken place till about five years ago, when it was found that the thing could be effected with the utmost facility, merely by adverting to a circumstance which had before escaped the attention of men. A she elephant had been caught in India sometime ago during her state of gestation, she was perfectly tamed before his parturition, and safely brought forth a male young one; this she suckled, and it attained the state of procreative ability in due time; with the powers, it felt the influence of sex; and, unlike to those elephants which have been reared in a wild state, whose sexual appetite seems to be entirely subdued, it became rampant in quest of a female. Many females rejected his advances with the most irresistible obstinacy; at last one was found (which had probably been

caught young, or perhaps foaled, like himself, while her mother was in bondage; but of this nothing is said), who was willing to admit his embraces, in consequence of which she conceived, and brought forth her young in due season.

From this fact I think it fair to conclude that, although elephants which have once experienced the charms of freedom rigidly refrain from sexual intercourse, yet there is reason to believe that those which have been once reared in slavery are so thoroughly domesticated, as not to refuse to follow the instincts of nature in a domesticated, more than in a wild state; and that, consequently when a breed of this sort has been any how obtained, it may be perpetuated as well as others.

From this fact also we may conclude that, though a wild animal which has been caught in the desert may be so far tamed as to become perfectly docile (for no animal is more docile than a domesticated elephant), yet it may still have its mind so much influenced by former habits, as never to become so perfectly tame in all respects as it might otherwise have been; hence it may have happened that many experiments have failed in regard to the breeding from, and thorough domestication of wild animals, which, under a different management, might have perfectly succeeded.

A third inference is, that in all our attempts to domesticate wild animals, with a view to breeding from them, the surest way to succeed will be to try to get their young ones in their earliest stage of infancy. Indeed this is so much the easiest way to succeed on

all other accounts, that wherever it can be done, none other should be in any case attempted.

The last inference I shall draw from it is, that when wolves, foxes, or other ferocious animals shall have been thus tamed, they may not only lose their natural antipathies, but may acquire habits extremely unlike to those that characterise the original stock. A gentleman of my acquaintance was surprised one day in going into an inn in the north of Scotland to find a dog, a cat, and a hare, lying together cordially on the hearth, basking themselves before the fire. In this way the Calabrian sheep-dogs may have been converted into the protectors of their natural game, and the enemies of their own kind. And in this way may perhaps every creature that can be useful to man be made, under a judicious management, to become subservient to his will.

Having thus endeavoured to clear away some rubbish that has long retarded the progress of improvement in this line, and to establish some general discriminative notions on this subject, founded on facts and well tried experience, let us now take a more particular survey of the objects referable to this head, with a view to discriminate those facts that are fully established from the vague notions that have been accidentally adopted without sufficient authority, and which still require to be authenticated by fair and accurate experiments, conducted with a necessary degree of intelligence and caution.

[*To be continued.*]

NATURAL HISTORY.

On the various ways adopted by nature for the propagation and preservation of animated beings.

IT is impossible to enter into a minute examination of the works of nature, under any one point of view, without being forcibly struck at the same time with the diversity of means that have been adopted by infinite wisdom to effect the same end, and the perfection with which that end is attained by them all: hence it is that man, who always wishes to define the limits of the operations of nature, is perpetually baffled in these his vain attempts, and finds himself at length reduced to the necessity of owning, that the more accurately he is informed on this subject, the greater reason he feels for becoming diffident in regard to such decisions.

All the large animals that are to be found on this our globe are susceptible of the distinctions of sex; and it is a rule, to which I know no exception, that among these no progeny whatever can be brought into existence without the concurrence of both sexes: yet we find that, though they all agree in regard to this one particular, they differ greatly in regard to some others that would have appeared surprising to us, had we not been familiarised to them from our earliest

infancy. The embryos of quadrupeds in general, and of some other classes of animals, derive their nutriment for a certain time directly from the female, during which period of gestation the members of the infant creature are gradually developed. In the progress of that development the principle of life becomes more and more active; till at last, having attained the full maturity that nature intended for it, the young is brought forth into the world a complete and living animal, bearing a perfect resemblance in all its members to the race of creatures from which it derived its origin, only of a smaller size. All those animals that bring forth their young after this manner are called *viviparous*, which word implies that the young, when separated from the mother, are obviously living creatures.

The young of all the other animals, which are large enough to attract the notice of mankind in general, are excluded from the mother in the form of an *egg*. All the creatures belonging to this class are said to be *oviparous*, or egg-bearing animals, the most conspicuous of which are fowls and birds of all sorts.

An egg is an object with which we are so familiar as to require no description in this place. Every one knows, that in its primitive state it discovers no appearance of animation whatever; nor could any one who had been accustomed to observe viviparous animals only, form an idea that a living creature could ever be produced from that stone-like ball. It is from experience alone then that we derive our ideas of the operations of nature, and not from instinct or analogy. If we had never seen an animal produced from

an egg, we should never have had the least conception that such a thing could have been effected. We should in that case have believed that all animals, when excluded from the female, must necessarily be in a living state, and bear an exact resemblance to their parent race; but as we have seen from the earliest period of our remembrance that eggs may be made to produce living creatures, this does not surprise us in the smallest degree. May not the same power which originally willed that this striking dissimilarity should take place between the mode of procreation of viviparous and oviparous animals, have also willed that other creatures shall be formed with a faculty of producing their young in a manner totally different from either of these? If such a thing can be discovered then, it should certainly excite no sort of astonishment in us; it ought only to put us in mind of the limited nature of our own faculties, and of the infinite power of that *great first cause*, who can diversify his operations to infinity, while at the same time they are all so perfectly adapted to the place they were destined to occupy in this universe, as to answer that purpose, in as far as we are able to trace them, in the most perfect manner possible.

If a female of those viviparous animals, with which we are chiefly conversant, be carefully separated from the male, she will not only never produce any living animal of her own species, but no embryo of it will ever be discovered. This is different in oviparous creatures. Though the female be shut up with ever such care by herself, her eggs will be formed, and will gradually increase in magnitude till they attain their

full size, and be as regularly excluded from the female as in any other situation. The eggs thus produced are, to all appearance, perfect; they are only found to be destitute of the principle of life: nor can any art ever make such eggs produce a living creature. The difference between oviparous and viviparous animals is not, however, here so great as at first sight appears. We have already had occasion to take notice, that the young of viviparous animals, during the period of gestation, derive their nourishment directly from the mother; this cannot be so with the oviparous classes, seeing they are totally separated from the female; the egg, in short, is destined to perform the same office as the matrix of the mother, and must, of course, contain the rudiments of the infant creature susceptible of being gradually developed, and also food to sustain the young embryo till it hath attained its full perfection. Such eggs then as have been duly perfected contain the principle of life in them, though still in a dormant state. To call this into action, and in consequence thereof gradually to develop the members of the embryo, the process of incubation becomes necessary. The parents are then impelled by the irresistible power of that invisible hand, “in whom all things live and move, and have their being,” to sit with a patient assiduity, for a proper length of time, upon these eggs; and, by the genial heat which is thus produced, to bring into action the vital principle, and in due time to complete the infant creature in all its members. When it hath thus acquired the necessary degree of strength to enable it to perform the vital functions, it bursts its confinement, and issues

forth a complete animal in the form of the parent race to which it belongs. It is then nearly in the same circumstances with the young of viviparous creatures at the period of their birth; it is weak, and stands in need of the fostering care of the parent, which the same unerring providence that hath directed all the steps by which it hath been brought thus far forward faileth not liberally to provide for it.

According to the destination of nature animals of the viviparous class are calculated, when full grown, to subsist upon food of various sorts; some to live wholly upon flesh, others upon grain, or herbs, or fruits of different sorts; but in their infant state, milk is the food appropriated for the whole: and, that this food may never fail to them, it is universally ordained that the young is no sooner born than milk flows in abundance into the members provided in the mother for the secretion of that nutritious fluid; and the infant searches for the teat almost as soon as it has drawn the breath of life, and knows perfectly at the first how to extract that fluid by means of suction, and thus to preserve its existence. From the oviparous class this kind of knowledge is totally withheld, because it was not intended that they should be thus subsisted: no milk is ever secreted by animals of this class: among these the young either gape with an undiscerning eagerness at the call of the mother to receive the food that she shall provide for them, or they run with alacrity at her call to pick up what she lays before them; the mother being directed to cull, with care, those morsels that are best suited for the nourishment of the species, and to cherish and protect

them in the way best adapted to their nature respectively. The person who can observe all this, and not be able to perceive the superintendence of a beneficent wisdom influencing the whole, must have the powers of his understanding totally obliterated, and his mind enveloped in impenetrable blindness.

The eggs of birds in general are covered with a thin flexible skin, which is itself protected by a hard shell, consisting of calcareous matter, which differ in size, colour and form, in each species; each variety, however, of the species preserving as constant an uniformity in regard to its egg through every individual, as there is observed to take place among the individual animals themselves: but among the lesser orders of creatures, insects especially, which are, for the most part, oviparous, the eggs are usually covered only with a flexible film, and differ from those above described in several other particulars that deserve to be adverted to; as every variation exhibits proofs of wisdom and design written in such legible characters, that he who runs may read them.

The life of insects in general in their perfect state is so short, that the parent has seldom an opportunity of seeing its living offspring: they therefore neither generate milk like viviparous animals, nor are they impelled, like birds, to sit upon their eggs to bring the young to perfection; but in place of this, the all-directing power hath endowed each variety with the astonishing faculty of being able to perceive what substance is fitted to afford the most proper food for its young, though that food is, for the most part, so totally different from that which the parent itself could

eat, as in many cases it would prove a perfect poison to it; and knowing thus instinctively this appropriate nutriment of the young, they are impelled, by an irresistible power, to search for it with the most indefatigable assiduity; and, having discovered it, they pursue it in spite of every danger or difficulty, the immediate prospect of death itself not deterring them until they have safely deposited their egg in the very situation where perhaps only the young could find food when in due time it is called into existence. Many insects thus fall upon contrivances that must afford matter of astonishment to every attentive observer, to convey their eggs into the body, or the internal viscera of larger animals; others to bury them in the body of other insects; others within the bark of leaves and vegetable substances of every sort; others to form nests, which they store with insects or reptiles that they know will have attained the exact state in which they are proper food for their young, when they shall awaken into life: some drop their eggs into the water, in which they themselves could not subsist one moment, as if they foresaw that their progeny in its first state of existence could only subsist in that element. In short, the variety of contrivances that are adopted by insects to insure the subsistence of their young when they shall come into life, would require many volumes to enumerate; and all the means they adopt are so perfectly adapted to answer the purpose intended, as to discover a degree of knowledge that leaves the boasted wisdom of man at an infinite distance behind. If he were to conceive these operations to

proceed from reasoning in these creatures, he would be impelled to say, not to the worm only, "thou art my brother;" but to the fly, "thou art infinitely my superior in wisdom and design." We shall have occasion, in a subsequent part of our work, to enter more fully into this singularly beautiful economy of nature; we now proceed to other objects which more immediately claim our notice in this place.

The young, we have already remarked, as soon as they escape from the eggs of birds, and the larger oviparous animals in general, appear at once in the same form nearly with that of the parents from which they derived their origin; but this is far otherwise with most kinds of insects. These make their first appearance in life for the most part under the form of a kind of worm, being in their form and manner of living so extremely different from their parents in their perfect state, as to form a very distinct class of animated beings. This is a circumstance so extremely different from what we have occasion to observe respecting the larger animals, as greatly to excite the astonishment of every person who is called to remark it for the first time. These worms, or larvæ as they are technically called, which proceed from the eggs of winged insects, form many distinct classes, which differ from each other in a great diversity of particulars, and are known by distinct names, such as maggots, grubs, caterpillars, &c. but they all agree in one respect, that, after having undergone various changes, and having fallen into a state of torpor more resembling death than life, having each individually first fabricated a sort of tomb for itself, they assume a new

life, burst the bars of that tomb which they had fabricated for themselves, and come forth new beings, for the most part extremely unlike to the form they previously bore: but in this state they invariably bear a perfect resemblance to the parents from whom the egg originally proceeded. It is always in this state that they obey the universal law of nature, by procreating their kind, and providing for the wants of that young progeny for which they have laid the foundation; and finally pay the last debt of nature, by a real death from which they revive no more.

Eggs, for the most part, have attained the full size they ever acquire before they are excluded from the female; but this rule, like most others, admits of exceptions. There is a numerous class of flies which deposit their eggs in the soft parenchymatous part of the leaves of many plants, that occasion a kind of tumour in the leaf which gradually swells into the form of a kind of hollow ball, in the heart of which the egg is placed. These balls are technically called galls; of which the gall nut employed in manufactures, that grows upon the oak tree, is the most generally known. These eggs, when they are deposited by the parent fly, are extremely small. The skin of the egg is a soft dilatable membrane; and this egg gradually becomes larger, as the members of the embryo are successively developed nearly in the same manner as the matrix of viviparous animals extends, until the fœtus has attained its full size, when it bursts the membranes in which it was confined, and comes forth in the form of a worm. This class of insects, then, may

perhaps be said to form the connecting link, in one sense, between oviparous and viviparous animals.

It is also a very general rule, that an egg contains only the germ of one young animal; but neither is that rule without exception. There is at least one species of insect, which was first discovered and described by Mr. Folkes, formerly president of the Royal Society, London, whose eggs contain several young at the same time; in this respect bearing a perfect resemblance to the uterus of those viviparous creatures, such as dogs, rabbits, mice, &c. which produce many young at the same birth.

Fishes, unless it be those of the cetaceous tribe, and a few others, are universally oviparous; but, in regard to one particular, these differ entirely from other oviparous creatures. The eggs of winged creatures in general are vivified by the male before they be excluded from the body of the female; but this rule is reversed in regard to fishes. The eggs of fishes, or, as they are usually called, the spawn, have not been affected by the male at the time they are excluded from the female. The male searches for these eggs after they have been deposited in the water, where he sheds his influence over them, and thus communicates to them the vivifying principle; after which the embryo is gradually developed by the influence of the season alone, and in due time the young fry force their way through the slender film of the egg, in the shape of the parents in miniature.

The frog offers another singularity that does not accord exactly with any of the cases stated above.

Its eggs, or rather spawn, are deposited in water in the manner of fishes, where they are afterwards fecundated by the male; but what is peculiar to this class of creatures is, that at the time even they are deposited by the female, the embryo hath assumed the form of a tadpole, though it be not yet endowed with the vivifying principle. Neither are these embryos, properly speaking, inclosed in an egg, but as if the whole mass of spawn formed only one egg, without any shell or other covering; the numerous embryos, which appear to the naked eye as so many black points, are imbedded in a thick glairy matter, adapted, no doubt, to nourish the young until their vital powers are so strong as to enable them to subsist without it, when they force their way from it as others do from the egg, and go in search of food elsewhere. Unlike to fishes and to fowls, the young at this time do not yet bear the same form as their parents, but move about in the form of a tadpole, the legs only beginning to appear after they have been for some time in a state of very active animation; and, having dropped the tail, the whole body by degrees assumes the perfect form of the parent.

The pipa, or large toad of Surinam, affords a more striking deviation from the ordinary course of nature than any of those we have above enumerated. On the back of the female of this singular creature are formed certain cavities of a peculiar kind, opening outward, and more resembling the cells of a bee-hive than any thing else to which I can liken them. They are of a circular form, about half an inch deep, and nearly one quarter of an inch in diameter each; they

are not close upon each other, but are placed a little apart, and are rather irregular than symmetrically arranged. At a certain period of incubation, if it may be so called, in each of these cells is found a little live toad, an exact miniature of its parents in all respects; but how it finds subsistence there (for the creature has no adhesion to the parent, but may be easily taken out at pleasure, without sustaining injury, as if from a case, and again replaced), does not seem as yet to be fully ascertained. Mr. *Firmin*, who has described this animal, declares himself to have been an eyewitness of the following procedure, by which we have been made acquainted with the manner in which they came there. The eggs are generated within the female, who, when they have attained the proper degree of maturity, deposits them on the ground. The male, on that occasion, attends her, takes them carefully up one by one, and places them in the cells above described. Of the length of time they there remain, and other particulars respecting this breed of young, we are as yet too imperfectly informed to be able to state with certainty.

Somewhat analogous to this are the circumstances that occur in rearing the young opossum. This is a viviparous quadruped, but the young are brought forth when they are of a much smaller size than those of other creatures of nearly equal magnitude, and long before they are capable of performing the ordinary functions of life. At the period of this premature birth they do not exceed the size of a bean, and discover very few symptoms of life; but the mother lifts them up with care, and places them in the inside of a kind of

pouch, with which nature has provided her beneath the belly; this pouch she has the power to open or shut at pleasure. The young being placed within this cavity, each of them attaches itself so firmly to a kind of nipples which are there provided for that purpose, that it cannot be separated from it without considerable violence. There it remains without motion, more resembling an excrescence of the animal itself than a separate creature, for a considerable time gradually increasing in size, like a foetus in the womb, and discovering more powerful symptoms of animation; till at last, having become sufficiently strong, it quits the nipple, when it may be said to undergo a second birth, by coming out of the pouch. But to this pouch it instinctively returns, either when hunger invites, or when danger threatens from without, as to a safe asylum in which it finds food and protection from harm. In this way the young are nursed, and carried about by their mother, until they attain such size and strength as to stand no longer in need of her assistance.

But the bee, an insect very generally known, affords an example of much greater deviations from the ordinary course of nature than any of these. We have been accustomed to believe, from our earliest youth, that all the animals which exist are either male or female, and that no creature in its perfect state is totally deprived of sex. The bee, however, first taught us to doubt of the universality of this rule; and experience, the result of the most accurate observation, having proved that these doubts were well founded respecting the bee, we have been gradually taught to discover that there are several other very

numerous tribes of insects, the majority of which, like the bee, are totally divested of gender, being of neither sex; though there are to be found among them all a sufficient number of males and females to perpetuate the species.

It had been observed many ages since, that in a hive of bees three different kinds, very easily distinguishable from each other, are found to concur in the different operations of the community; but the idea that any of these could be totally destitute of sex, appeared to be so directly opposite to every notion we could form of the established laws of nature, that it was with extreme reluctance men would consent to admit that as a fact; and it is not many years since philosophers found themselves compelled, by the result of reiterated observations, to admit that it really is so. It is now, however, universally allowed, that in every working hive of bees there is one female, and only one; no more being ever tolerated to live there, except a few young ones before the season of swarming. This single female is literally and truly the mother of the whole hive, she alone laying, in the course of a year, not less than fifty thousand eggs, and none other in the hive depositing one. From the great and singularly marked attention that the whole hive pay to this female, and the powerful protection they voluntarily lend to her (every individual, without hesitation, exposing his own life for the protection of her person), and, from their singular despondency, should they be accidentally deprived of her, without a possibility of getting her replaced, this female has been denominated the queen bee. There are also a sufficient number of

males in every hive for continuing the species; but by far the greater number of individuals in the hive belong to that class which are of neither sex, and which, on account of their being perpetually busied in forwarding all the laborious operations of the hive, have obtained the name of labouring bees. These at all times guard and protect the queen with the most sedulous care, attend her wherever she goes, and fight in her defence with the most insuperable obstinacy. With these little creatures, the hackneyed phrase so often prostituted by others, of either conquering or dying for the cause of the community, is literally verified: millions of them may be killed, but while they live they prove true to the cause of their queen. But if, by superior power or artifice, that darling object of all their care be killed, or abstracted from them, they search for her every where with the most alarming disquietude; and, being at length fully satisfied she is gone, and that they have it not in their power to obtain another, they abandon themselves to despair: all the labours of the ever-busy hive are, from that moment, suspended; food itself is neglected by them, and in a short time they all inevitably perish. If, on the other hand, while they labour under this fit of despondency their queen be restored to them, this house of mourning is converted, in one moment, into a scene of activity and joy. Each individual is alive and active: all their labours are resumed with the most prompt alacrity, and universal harmony is instantly restored,

Man, who is ever prone to judge of the internal

impulses that actuate other creatures, on all occasions, by the sensations of his own mind, can form no idea of this seeming heroical display of the most disinterested attachment to the female and her descendants, in an insect totally incapable of ever having any progeny of its own: but it is equally easy for that power which, by an irresistible impulse hath implanted in so many other creatures an invincible attachment to the young, which in obedience to his supreme decrees they have been the means of ushering into life, to impress others with similar sensations when he hath chosen to make use of them as his instruments in effecting his behests. Among this class of creatures neither the male nor the female take the smallest concern for the young from the moment that the eggs are secluded from the mother, and duly impregnated. They are, from that moment, intrusted wholly to the working bees, the whole business of whose life seems to be entirely dedicated to the care of the eggs, the feeding of the larvæ when hatched, protecting and rearing them. They begin their task even before the eggs are laid, by building cells, formed with the most amazing economy and art for receiving these eggs; and they conduct the whole of their operations with such regularity, order, and active industry, as to have attracted the notice, and commanded the admiration of man since the remotest ages; and which we shall have occasion more minutely to trace upon some future occasion. At present it only belongs to us to take notice of one other particular respecting the generation and economy of this insect, which, as it hath

no parallel with which I am acquainted, forms a most singular exception to a law of nature that would be otherwise deemed universal.

Nothing respecting this life hath been more carefully concealed from human beings, and all other creatures we know, than the sex of that offspring that is to proceed from them. It is only after the young have made their appearance in life, that this point can possibly be discovered. This circumstance, so carefully concealed from all others, would seem to have been revealed to the bee alone. We have just had occasion to remark, that the working bees take care to provide cells for the reception of the eggs that are destined to proceed from the mother bee; and in every infant hive the providing of these cells is the first business they undertake. As there are three orders of bees, each of which differs in size from the others, and, as the bee carries on all its operations with the most scrupulous exactness and economy, in order to enable them to do this they are, it would seem, endowed with the faculty of knowing which egg will produce a female, which a male, and which a labouring bee. These last accordingly take care to provide a proper number of cells, appropriated for the sustentation of the larvæ of each of these classes; and no instance hath ever been observed of a young animal of one class being hatched in the cell appropriated for those of another; the young that are found in the royal cells are invariably females, those in the cells of drones are as invariably males; and none but working bees have ever been discovered in the common cell. As it is universally admitted the eggs are never shifted

from the cells in which they were first deposited, nor the larvæ from that in which they were hatched, it seems to be impossible to deny that the creature which deposited those eggs must have been sensible of the gender of the germ contained in the egg when it was there deposited.

But the wonders which the economy of this insect hath brought under our view are so numerous, that we know not where they will end. The circumstance of the three orders of bees above stated has been known for ages; and of course the attention of philosophical observers hath been strongly directed to the contemplation of its life, generation, and economy. In consequence of this, the literary world was much surprised about forty years ago by the publication of an account of certain discoveries said to have been made by a Mr. Schirach, of the Academy of Lusatia, respecting the nature of these three orders of bees, which, though it does not materially affect the wonderful part of the above hypothesis, modifies it in a certain manner, and serves to shew how small a progress man hath yet made in the knowledge of the operations of nature. This worthy clergyman found that, when a parcel of working bees were shut up in a close hive with a piece of honeycomb that contained the cells of working bees only, being thus deprived of their queen, they remained in a state of inactive despondency for some time. But, if there were one or more worms in these cells that had been hatched not more than three or four days, they had it in their power to form a queen for themselves. With this view, when they found no other means of obtaining a queen,

they began to rear a royal cell of the usual form; and, having placed in it the worm they had chosen for that purpose, they fed it with the food appropriated for the royal larvæ (which is very different from that given to those of the working bees), and nursed it in every respect as they would have done the royal worms in a common hive. From the moment they had adopted this measure, as if aware that they would soon be provided with a female to continue the species, they resumed their labours with the usual alacrity, and in due time the worm was changed into a crysalis, and soon issued from its cell in the form of a complete and perfect queen bee; being in no respect different from those of that class produced in the usual way, and capable of laying eggs and performing every other function of the mother bee.

The procedure is, in this case, so extremely different from any thing that is observed to take place in the usual course of nature, that it gave rise to many speculations among literary men. The fact was strongly controverted; but, after a long contest, the experiments of Mr. Schirach were so fully corroborated by those of Mr. Debrow and others, that it seemed no longer possible to resist the evidence; and the fact is now universally admitted to be precisely as he had originally stated it to be. Thus do we perceive that, as if it were with a view to moderate the pride of man, the Almighty hath been pleased to endow a trifling insect with powers, in some respects, so much beyond those that he hath conferred upon man, and the other nobler animals, as he is pleased to call them, that they can only contemplate it with

wonder. But what is there in this that is not common with the most ordinary operations of nature? They are all alike inexplicable by us. I will, for example, that I should raise my hand to my head, and I feel that this is instantly done; but I am equally ignorant how mind can operate upon matter, as I am ignorant of the way in which the bee can modify at will the sex of its progeny. It no doubt feels, as we do, that it can do so, and therefore does it; but how it should be endowed with that power, it knows no more than we. No one of the operations of nature, then, in the eye of reason, deserves to be accounted wonderful more than another; they are all alike above the reach of our finite comprehension. All we can do is to observe a few of the facts that are placed within our reach; nor shall we then fail to perceive the most incontestible proofs of wisdom and beneficence in the hand that directs the whole, if we shall be sufficiently informed as to be able to appreciate them. Other phenomena equally incomprehensible remain to be stated.

[*To be continued.*]

MISCELLANEOUS LITERATURE.

To the Editor of Recreations in Agriculture, &c.

Lucubrations of Timothy Hairbrain.

My son Thomas, make money. Make it honestly if you can; but—make money.

“BETTER be dead than out of the fashion,” is a maxim that, if practice be admitted as a rule for judging, seems to be universally acknowledged as an incontrovertible truth. If so, I have great reason to dread that my present lucubration will be rejected; for it is my intention strongly to recommend a very unfashionable accomplishment, if you will not admit it to rank as a virtue. Strange! you will say, that any person should be so little acquainted with the spirit of the times, as to think of seriously holding up to view, as worthy of imitation, that pitiful antiquated quality so much admired by our great grandmothers under the name of *domestic economy*; a vulgar phrase which no polite person would suffer to escape their lips, unless it were to turn it into ridicule: and a most excellent subject it is for that purpose. “There

is a time for every thing," saith the wise man; "and doubtless," says pretty Miss Pert, "the reign of that miserable fashion expired long before our day. We will no more be governed by the sage *saws*, than we will be laced up in the strait stays, or deformed by the enormous hoops, of our grandmothers. *Nous avons changé tout cela*. We have adopted the more fashionable maxim prefixed to this essay, as infinitely more suitable to the taste of the present day. Yes, make money; by all means make money. It is none of our business to inquire how it comes: it is enough if it can be obtained. And then, you know, "light come, light go." We shall make a figure in the tonish circle, without which life is not worth enjoying." Such is the taste of the times; and wo be to him that shall attempt to resist this mighty torrent, for it exceeds the utmost extent of human powers to withstand it.

If so, I may expect that I and my essay will be treated as a fiery youth, who was offended at the austerity of Dr. Johnson, proposed should be done with him; which was, that he and his large dictionary, and all his other works, should be tumbled down stairs together, where they might be allowed to expire, mingled *pel mel*, like the Russians, Austrians, Italians, and French, at the battle of *Novi*.

Yet who knows but that among those changes which are perpetually taking place in this miserable planet on which we crawl, a time may yet arrive when that which is so much out of fashion at present may come to be quite the ton. Solomon has said, "there is nothing new under the sun;" and our own experience

may teach us that, when any whim of ours is carried to an extravagant point of excess, there is a great probability that it will very quickly fall into disrepute. Ten years ago the *Grande Monarque* in France was the great object of the pride of the nation. The people thought themselves honoured in being accounted his slaves, and looked with contempt upon all other nations who had not that privilege. That whim has had its day; and the very people who then gloried in that particular, would now spit in your face were you to mention it. Two years ago the *Grand Nation* was the cry of the day. Nothing else was heard of; and the *Directory* had obtained a more despotic sway over the minds of the people than ever the *grand monarque* had in the utmost plenitude of his power. That whim has also had its day; and present appearances seem strongly to indicate that, before two years more shall have elapsed, the *Directory* will be as much out of fashion in France as *the last of the Capets*. Such, then, being the fleeting state of the reign of fashion at all times, let us never despair; but trust to the chapter of accidents for turning the public opinion, sooner or later, in favour of that which reason and sound sense must always approve, how much soever it may be for the present despised.

* A famous nation of antiquity cherished for a long time one of the most singular whims, our people of fashion will surely say, that ever entered the mind of man. These filthy creatures had the shocking monstrosity of preserving the bones of their ancestors with as much care as a certain kind of spiders preserve the eggs which contain the embryos of their descendants,

which they carry perpetually about with them, and will sooner part with life itself than this (to them) dear and precious burthen. Let us leave the spiders to do as they like. This seems to be no whim in them, but an immutable law of nature from which they cannot depart. "But, thank God!" says Miss Pert, "that is not the case with regard to us *rational creatures*. We have too much trouble, God knows, with these parents of our's while they are alive, to trouble ourselves about them any more after their death. Instead of lumbering the house for ages together with their nasty bones, we have plenty of undertakers, who, for a reasonable gratuity, free the house at once from all such trumpery, and put it in as good order in an instant as if no such person had ever existed. What a horrid spectacle it must have been to a person of fashion, when invited to a banquet, to see a set of mummies, up to the tenth or twelfth generation backwards, displayed as evidences of the antiquity of the family to which they belonged! How very absurd too, to pride themselves upon that circumstance! for may we not all say with *Will Honeycomb's* wife, that we had ancestors as far back as the best of them, only we have forgotten their names. Besides, we know that for a few guineas, *properly* disposed of, a skilful genealogist may be procured who will rear up for us a stately tree springing from the body of *Brute*, or *Tubal-cain*, or any other ancestor we shall more fancy, with its branches spreading wide, containing all our predecessors upon it like so many apples, *seriatim et nominatim*, up to our own dear selves, who stand upon the highest pinnacle, ready to

push out new branches that shall reach in time, like Mahomet's *cock*, even unto the third heaven."

"Could any thing," says Ephraim the Jew, "be more absurd than the practice of these mummy-hoarders, who could not obtain a shilling without depositing, as a surety for the money borrowed, the bones of one of his ancestors? A thrifty Israelite never could have subsisted among such a people: for you are to observe, that the greybeards only had the custody of these precious relics; so that the sons, those spirited youths who bleed so freely, had it never in their power to apply for our assistance. Besides, as the lady of the house must have been degraded to a station lower than that she formerly held, had one of these proofs of her honour been wanting, she must have had the mortification of either foregoing her routes entirely, or walking behind some proud dame, whom she formerly used to precede. What a mortifying alternative! The lady of the house, therefore, must have been as cautious about parting with any of these relics as the master of the family; so that there was no possibility of getting about these old hunks. Under these circumstances, not one shilling could be had more than one's own; and persons of spirit must have been then obliged to drivel out a life of economical insipidity, without being able to *make a dash* in the circle of fashion, unless one had the advantage of possessing a long line of frugal ancestors, who, by accumulation, had acquired funds of *their own* to exalt them above their competitors. Thank God, this is not the case now-a-days. A person of *spirit* may live like a nobleman, without having any funds of his own, if he

have but a knack at the *savoir faire*, which it is well known some of us possess to a nicety."

But to return from this ramble, to which, you know, I have too natural a propensity, and to be serious: whatever may be the fashion of the time, and how much soever our judgment may be perverted by the allurements of pleasure, where we ourselves are a party concerned; yet it invariably happens, that when things are viewed at a distance, that independence of spirit and dignity of mind which can spring from no other source than a judicious economy, hath at all times, and in all nations, commanded the reverential admiration of the whole human race. Hence it is that we bow with reverential awe at the very name of *Aristides*, who, though he had more power in Greece than any other man of his day, lived upon his own in a respectable poverty, and died without a wish to appropriate to his own use one shilling that belonged to another. Hence, too, we venerate the moderation of Timoleon, who, having disposed of kingdoms as he judged best, reserved nothing for himself but the privilege of ending his days among those whose security and independence he had insured. Hence it is that all nations pay the willing tribute of the most unfeigned respect to the name of Cincinnatus, while that of an *Apicius*, a *Lucullus*, or a *Heliogabalus*, who expended more money at a single entertainment than would have supported the frugal dictator honourably during the whole course of his life, are scarcely heard of among men, or are mentioned only with scorn or contempt. Hence also it is, that even in our own day all mankind concur

in venerating the steady moderation of the modern Cincinnatus, who, after having "fought a good fight," despising alike the allurements of power and the pomp of wealth, retires to the shade of his vine and fig tree, to enjoy, in a peaceful serenity, the evening of a well-spent life, accompanied by the prayers and kindest wishes of every good heart; while many others, with whose names I wish not to sully these pages, whose hands are yet stained with blood, and whose souls have been degraded to the lowest pitch of meanness, for the acquisition of wealth, which, when obtained, is only squandered with the most prodigal profusion, are the objects of universal detestation. Yet these poor wretches were, and are, no doubt, surrounded with reptiles and toad-eaters, who, so long as they are permitted to bask in the sunshine of power, idolize them as gods, and study with a most prompt alacrity to fore-run, if possible, their slightest wishes. This may be the case; but these upstarts in wealth and power can never forget that those who were one day the guests of Roberspierre, were his executioners the next. In the midst of the banquet they must see the sword hanging above their heads; and they know not how soon, nor by what hand, the hair by which it is suspended may be broken. Such is the happiness that wealth, *got how it can be got*, is capable of insuring! Such are the pleasures that an adherence to the favourite maxim can procure!

I must confess, Mr. Editor, that when I contemplate the natural consequences of that spirit of profusion and prodigality which so generally prevails in this country, and contrast it with the inevitable fruits

of a wise economy, it gives rise to a long train of ideas, which, in spite of my natural levity at times, inclines me rather to the serious cast; and I could wish that you would give us some observations on the subject after your own manner. A great orator described one of the basest characters that hath appeared on this globe, as being profuse of his own, and greedy to possess the wealth of others. The character was evidently drawn from the life; and we see, that in our day the first part of the character, wherever it occurs, can seldom be separated from the last. The man who is heedlessly profuse must soon be involved in difficulties whatever be his fortune; and, as he naturally has acquired a taste for pleasure, and has no enjoyment but in that giddy round to which he has been accustomed; when his ordinary funds fail, he must grasp at every object that can promise to supply this dreadful want. In the giddy whirl of dissipation, no principles can be sufficiently fixed to withstand those temptations that assail; so that, in the energetic language of Shakespeare,

“ He’s fit for treasons, stratagems, and spoils.

“ Let no such man be trusted.”

On the other hand, when the mind from its infancy hath been trained up to habits of order and economy, the most moderate fortune is sufficient to supply the physical wants of the body. Poverty is neither felt nor dreaded; the mind, being at ease, hath room to expand itself in every direction. It contemplates with pleasure those heroic virtues which have been the admiration of all ages, and forms itself upon these mo-

dels. It sees that wealth is *in itself* incapable of doing any good in this universe, and therefore it is not coveted with inordinate desire. It can neither elevate the mind of the possessor, nor augment the sphere of his munificence. He soon observes, that it has rather a natural tendency to debase the first, and of course to curtail the last. He soon discovers, that it is not in proportion to the wealth of an individual, or the extent even of his alms-giving, that charity abounds. True charity consists in acts of sympathetic tenderness and kind assiduities bestowed upon objects who are justly deserving of them; while indiscriminate alms-giving very often tends to encourage villany and vice, rather than to cherish and support drooping virtue. It is the man only who “searcheth out the cause that he knoweth not” who is possessed of the genuine spirit of charity; not him who bestows great sums to remove a disagreeable object from his sight: nor can any one but the patient economist either take this trouble upon himself, or have it in his power to do what his heart shall dictate as proper to be done. Pope’s Man of Ross was “passing rich” with an income that would scarcely support some extravagant *beggars* of the present day a week, instead of a year.

It is the surplus that a man hath to spare after the wants of nature are supplied, which constitutes riches; not the sum of money that a man obtains within the year: and it is a spirit of content, the result of that riches, which constitutes that independence of mind which leads a man to look down with contempt upon every kind of meanness, and ennobles the human

character. It was this that exalted a Fabius and a Cincinnatus in the eyes of their countrymen and all succeeding ages, not the abundance of their money. It was the want of this that degraded a Catiline, and has made him with justice the object of execration wherever his name hath been known. Let not those among us, therefore, who do not abound in wealth, be accounted mean; as the reverse may be frequently the case,

For the thing I detest, and abhor as a curse,
Is poorness of spirit, not poorness of purse.

These remarks occurred to me lately from a conversation which I accidentally overheard in a coffee-house that I sometimes frequent. When I entered there one day several persons were deeply engaged in a discussion which I soon found respected the quota that some one had offered as his proportion of the income tax. One of them was vehemently declaiming against the shameful iniquity, as he called it, of the person to whom they alluded, for stating his income to be no more than one hundred pounds a year (how they came to know this circumstance, I did not learn). To this another most willingly assented, and was very lavish in his abuse of the unknown gentleman. A third, who by his dress appeared to be a clergyman, with great volubility kept up the *charitable* philippic, adding many benevolent comments which had escaped the other two. When he had at last come to a close, a little elderly gentleman who sat beside them, but seemingly a stranger to the other three, with great politeness apologised for

using the freedom of venturing to speak; but he said the subject seemed to be so interesting, that he was desirous of having some farther information respecting it; for, he observed, it was doubtless a matter that nearly concerned every individual in the community, that justice, in regard to this particular, should be as strictly administered as possible. To this they all readily assented, and said they would with pleasure afford him every information that was in their power to give. “I presume, then, gentlemen,” said he, “from the manner in which you have delivered your opinions, that you are all well acquainted with the person of whom you speak, and well informed respecting the nature and amount of his income; or at least have had the best opportunities of witnessing the internal economy of his family, so as to have a pretty exact knowledge of the amount of his annual expenditure; for I am perfectly satisfied, that nothing less could have induced gentlemen, especially those of your cloth, sir,” bowing to the clergyman, “to form such a decisive judgment, and to express themselves with so much freedom, in a case of this nature.” He was going to proceed, as he scarcely seemed to think a reply necessary; but he was stopped by a general, No; uttered with a certain degree of hesitation. ‘No, sir,’ said one of them, ‘I cannot say that I am acquainted with the man, or ever was in his company; nor have I had an opportunity of knowing with any degree of precision, either the amount of his income or the manner in which he lives in his own family. He is a stranger in our neighbourhood, having come to this part of the country only a short time ago. He does

not seem to court acquaintance with the people of the place; but I sometimes see him pass by, and I can easily perceive that he has the dress and the appearance of a gentleman. The people that sometimes call upon him are always of the genteeler sort; some of them of considerable rank. Now, sir, I presume you will agree in thinking with me, that a person who has acquaintance of the kind I mention, who will take the trouble to wait upon him now and then, in a familiar manner, could not possibly live at all upon the small pittance I have mentioned.' The old gentleman only answered with a slight nod; but he eyed the person who spoke to him with a penetrating glance that attracted my notice; then, as if checking himself, his countenance instantly resuming its former serenity, he in a mild accent resumed, "Pray, sir, may I be so bold as to ask, does the gentleman keep a carriage?" 'No, sir, he does not.' "A horse?" 'No.' "One or more male servants?" 'No, none.' "Has he a wife or family?" 'One lady, probably his wife, but no other family, I think.' "How many maid servants?" 'I believe only one.' "Is his house a high rented one?" 'No, sir, I think it is a house rather low rented, with a nice walled garden behind.' "It produces fruit then, and some vegetables for the table?" 'Yes, sir, I have heard so; and I believe the gentleman amuses himself a good deal in that garden, by doing all the light work with his own hand.' "Pray sir, I beg pardon, but I hope you will not deem it impertinent if I ask you one question more, it is, what sort of character does that gentleman bear in the neighbourhood since

he has been in it?" 'I cannot say, sir; he is very little known, he talks little with any one, and intermeddles with nobody.' "Does he pay for every thing he buys?" 'Yes, I believe so, honestly, and with great punctuality; but he is strict in reckoning; and if he ever finds himself overcharged, pays it for once rather than enter into a dispute, but on no account will ever employ, a second time, the person who does so.' "Do any of the persons about him ever alledge that they have heard him deviate from the truth in any case?" 'No, sir, I have not heard that ever this has been laid to his charge.' "And pray, sir, is this the man," assuming a sterner tone, and a look of inexpressible keenness, "whose name you have dared to mention with such unadvised disrespect? It now appears, from the evidence of your own lips, that you have rashly accused him of one of the grossest crimes to the community that can be committed, and as being guilty of an act of the greatest meanness that man could be capable of; not only without the smallest shew of evidence to support such an injurious charge, but even in direct contradiction, by your own account, to the strongest probabilities. And you, sir," turning to the clergyman, "you, sir, whose duty it is to inculcate the benevolent doctrines of a pure christianity; you, who ought to appreciate the importance of the precept, 'judge not, that ye be not judged;' you, who ought to know that the essence of christianity is beneficence and universal charity; not that bastard alms-giving which hath too generally usurped the name, but that spirit of kindness which putteth the fairest construction, that it can possibly bear, upon

every word and action of all mankind. Ye also have been assenting unto this thing. And upon what foundation doth all this uncharitable construction of yours rest? merely upon this, that you yourself do not think it would be possible to live upon the sum that this man declares to be his income. If you must have your dishes dressed with the niceness that might please the fastidious palate of an Apicius, or if you must have your table served with the pomp and elegance of a Lucullus, does it follow that every man must be a scoundrel who declares that his income is not such as to enable him to procure such luxuries as these? By this rule of judging, Cato must have been a rascal, and Cincinnatus the most despicable of mankind. For shame, gentlemen! let not such words ever escape your lips in future; for they must degrade you in the opinion of all who shall have the chance to hear you. Were your auditors to put as harsh a construction on your words, as you have done on those of others, how easy would it be for them to say, that as it is natural for men to judge of the actions of others by the same rules that actuate their own minds, it is impossible for one who has a grovelling spirit himself to conceive that another can act with a dignified openness and candour. If he himself would be disposed to have recourse to mean subterfuges and evasions in order to benefit himself, he will necessarily suppose that others have been guilty of a similar kind of meanness. I will not accuse you, gentlemen, on this occasion, of such a grovelling mind; but assuredly your conduct would better authorise that construction, than the conduct you have reprehended will authorise

the construction you have put upon it. Allow me just to say, before I conclude, that so far am I from agreeing with you in thinking that a person cannot live upon the sum you have mentioned, I have the best reason possible for knowing that it not only can be done, but that it actually is done, by some of my acquaintance; not only with ease, but with a cheerful hospitality, which, under the direction of a well regulated economy, and moderation of desires, produces a much greater degree of real affluence than you meet with in many families who spend ten times that income. I hope, gentlemen, you will excuse this freedom in an old man, whose age entitles him to do what would be unbecoming in a younger person. I wish you a good day." So taking up his hat and cane, he walked away. The gentlemen seemed to be a good deal abashed with this address; and as I thought that my presence added to their embarrassment, and not wishing to hear any more of their remarks, I did not remain long behind him.

TIMOTHY HAIRBRAIN.

The Editor is obliged to his old correspondent for the above observations, to the justness of which, in general, he readily assents. And, as he deems the subject of considerable importance, he hopes Mr. Hairbrain, and his readers, will pardon him for having made the conclusion to the History of the Recluse (which is received, and shall be forthcoming), give way to it. Of the vast importance of a spirit of economy, considered in a political light, in influencing

the general conduct of the people, in augmenting industry, and promoting domestic happiness, so gently touched upon in the author's own way, in the above essay, he is deeply sensible; and he will not fail, when a proper opportunity offers, to suggest a few additional hints upon that head. In the mean time he waves it, that he may make a few remarks on another subject that is hinted at in the above essay, and which seems more immediately to claim attention, viz. the *Tax upon Income*.

Many letters have been transmitted to the Editor on this important subject. Few of them are so temperate as the above; and coming from persons who wrote chiefly from the impulse of the moment only, without having duly considered the great delicacy of the subject, they did not seem to require immediate notice. Taking, however, a general view of the whole, it appears to be very evident, that there must be some considerable defects in the law; and that it would be well if they were as soon as possible adverted to and amended: and though I am aware that this may be, in some instances, a task of considerable difficulty, yet it by no means follows that it should be disregarded. We have had of late too many instances before our eyes of the fatal effects that have resulted from a remissness in this particular, not to have our minds strongly impressed with a conviction of the necessity of not shrinking from a task of this nature, while the spirit of the times admits of sound deliberation and practicable meliorations. Britain has the good fortune to be at the present moment in a singularly enviable situation in regard to this particular;

for never, perhaps, since it was a nation, were the people at large so cordially disposed to co-operate cheerfully in every measure that affords a prospect of promoting the public tranquillity, or of augmenting the general prosperity of the state; and it ought to be the wish of all good men, that every untoward event which might have a tendency to derange that spirit of cordial unanimity, may be guarded against with the utmost care, and kept at as great a distance as possible, wherever it can be foreseen.

In a political operation of such magnitude as the income tax, every considerate mind must be sensible, that it is impossible for the clearest understanding that ever was enjoyed by any of the human race to foresee all the consequences that can result from it, as affecting the political economy of the state, or the morals and manners of the people. Under these circumstances, the dictates of the soundest wisdom can go no farther than to suggest the necessity of watching, with the most careful solicitude, the gradual development of every incident as it begins to operate upon the human mind, and to mark with all possible precision its distant tendencies; so that proper remedies may be applied before they have acquired such a sway as to become irresistible. A man who observes, upon the edge of a declivity, a stone just beginning to move, may, by a very gentle power applied in due time, stop its motion, or direct it another way; but if he allow it once to get into motion, it will very soon acquire such an impetus as to overcome a hundred thousand times the power that would at first have been sufficient to direct it. Just so it is in po-

litical economy. The germs of great events appear as nothing to inattentive observers: it is only those who have been accustomed to remark the progress of similar incidents who can perceive them in their infancy, so as to eradicate them before they have taken such firm root as to be able to withstand every power that can be brought to destroy them.

It has been the policy of some of the wisest supporters of the British constitution to guard against every great innovation; because of the difficulty of perceiving what may be its real tendency. The income act is certainly the political innovation of the greatest magnitude that hath taken place in our day; and, next to the law for establishing a poor's rate, the greatest that has taken place within the records of certain history. The real tendency of the poor's rate, we all now know, was not foreseen when the law was enacted: we even now only begin to see a few of those evil tendencies, the utmost extent of which no man will be bold enough to venture to appreciate: yet that law was deliberated upon for years before it was enacted, and every precaution that the most cautious foresight could suggest, taken to guard against evils. The income act, we also know, was pushed forward with such precipitancy, that the very persons themselves who proposed it were forced to stop it, I may say, in its progress, and to alter it before it could be attempted to be carried into effect. To expect that, under these circumstances, a law can be made which, embracing as it does, such an infinite diversity of complicated cases, should be, at the same time, so equitable as to bear with nearly an equal pressure upon

each individual, and so clear as to be intelligible to every person who was to be affected by it, is to suppose that the framers of the law were endowed with powers which infinitely transcend every thing that has ever been observed upon this globe. When, therefore, we say that it is neither so equitable nor so intelligible as it ought to be, we only say, that experience has confirmed that which sound reasoning would have declared, *a priori*, must of necessity be the case.

It is not my intention to enter deeply into this investigation; for nothing can be farther from my mind than to excite doubts, or to promote discontent. My aim is directly the reverse of that. The cases that are now before me are, many of them, so strong, and individual complaints so evidently well founded, that it is but too obvious if these shall not be speedily attended to, they will force themselves into notice, in spite of the earnest desire that at present so happily prevails universally to suppress them. I wish merely to hint, very gently, at a few circumstances that do not materially affect the multitude, in hopes that they may be adverted to by the discerning few, who, not having had the same opportunities with me to observe them, may, perhaps, run a risk of overlooking them, till it be too late.

The circumstance which in the present state of things seems to have occasioned the greatest number of embarrassments, is, the precipitancy with which the act was carried into effect; in consequence of which many persons, though animated with the best intentions possible, were called upon precipitately to

perform very important duties, with the nature of which they were totally unacquainted, and which they found themselves unable duly to perform; for the act was hardly passed, when people were called to give in statements founded upon data that they did not know. Even when the act was printed, it is nothing surprising that plain men who read it, did not, in many cases, rightly understand it. The commissioners themselves, who were appointed to carry it into effect, were very generally at a loss how they were to conduct themselves; and it appears, that certain deductions and statements have been admitted by one set of commissioners, that have been wholly rejected by others. These things will come to be known, and they will occasion discontents; it would be very fortunate if such discrepancies could be guarded against. Some of my correspondents complain of proceedings in the commissioners that they account wanton and arbitrary, and wish me to publish their statements, which assuredly I shall not do; but, if such things have been done, it is to be hoped they will be carefully guarded against in future.

Many of these correspondents state cases, about which they are in doubt, respecting the mode in which they ought to estimate their income; and are desirous to have the public opinion concerning them. I shall briefly mention a few of these. One says, that, having taken a farm some years ago, which was then in a very bad state (this is situated in Scotland), he not only drew no profit from it for several years, but expended upon it above one thousand pounds, in the prospect of drawing back this money before the end

of the lease, in consequence of superior crops. There are ten years of his lease to run, and he has not yet drawn back more than two hundreds of his thousand pounds; he asks, whether he should state the whole profits he draws from his farm as his annual income; or if he should not deduct from that amount eighty pounds each year, this being only a repayment of his capital, and not annual income in the strict and proper sense of the word. And who can doubt, if his calculation be fair, as above stated, but this ought, in strict justice, to be the case? Yet he says that, having stated this case to the commissioners, they would not admit it, but charged him for the whole as income. Assuredly this case does not essentially differ from that of a man who had lent one thousand pounds to another, who undertook to pay up the capital by ten equal instalments, one each year, and five per cent interest for whatever remained unpaid. In this case the money lender would receive the first year one hundred and fifty pounds; viz. one hundred of capital, and fifty pounds as the interest of one thousand pounds for one year. No man could hesitate about saying, that this person stated fairly such item of income by calling it fifty pounds. So it ought certainly to be in the other case.

Another says, that he purchased an annuity for twelve years certain, for which he gave a stipulated sum; he wished to state his income so as that, at the end of the period, he might have his purchase money safe; but, instead of this, he was not allowed to make any deductions from the amount of his annuity, accounting the whole to be annual income.

I might state a variety of cases, from which it appears, that either from the imperfection of the law, or from the ignorance of the commissioners, persons whose real income are exactly the same are rated very differently, merely from the accidental circumstance of their appearing under different denominations; but it is enough for me on this head to bring these things under notice. I hasten to a view of the subject that is less displeasing.

The above, and many other similar difficulties, may be all, with a due degree of attention, removed by a new law, containing more precise enactments, accompanied with more particular instructions to the commissioners, should it be found expedient to continue the law till the whole sum proposed to be raised by it shall be liquified. But the circumstance that threatens more deeply to affect the political system remains to be noticed, as it is not so immediately obvious as these; though it must, if not very speedily adverted to, inevitably produce a silent change in the system that will not be easily amended.

It is a fact well known to every attentive observer, that no one class of persons in the community has so hard a struggle to get through life in a becoming manner as that of gentlemen possessing landed estates from two to five hundred pounds a year, who live on their estates; for these persons, having obtained the education, and holding the rank of gentlemen, must necessarily associate with persons of that rank; many of whom, though they may perhaps be their inferiors in point of birth, so greatly exceed them in fortune, as to make it a very difficult matter to live with them

upon a footing nearly of equality in point of gentility, without incurring inconvenient expense. The education of children too in that line of life, and the finery that the female part of the family ever aim at, with the giddy extravagance of young men, all concur to make the life of such a person a state of perpetual struggle and disquietude. Yet, though these men are themselves subjected to such an accumulation of evils, they are, without a doubt, among the most useful members of the community; and contribute more, by the extent of their knowledge and suavity of manners, to humanize and improve the country, than any other class of men. Their education qualifies them to act with singular propriety as justices of the peace: their habit of thinking frees them from the danger of adopting those mean shifts which too often characterise those of lower ranks, who have risen to some distinction in consequence of the sudden acquisition of wealth, and gives a dignity to them when in office, that checks a number of improprieties of conduct to which their coadjutors would be naturally prone; thus conferring respectability upon a court, which, when properly conducted, tends more directly to preserve order and tranquillity in the state than any other. By their general residence in the country upon their patrimonial estates, and their attention to agriculture as a business or amusement, they tend to diffuse the knowledge of useful improvements among their inferiors. They give employment to the poor: check excesses in parish officers, by their continued attention and influence, and thus moderate the poor's rates, at the same time seeing that the real poor are properly

treated: in short, they give a steadiness and consistency to the whole community, which it never could enjoy without them. This class of men, therefore, ought, by a wise and beneficent legislature, to be guarded as the apple of the eye; since the annihilation of it must necessarily effect a change infinitely for the worse. But the law, establishing a tax upon income, has a necessary and a powerful tendency to produce this effect. A deduction of ten per cent out of an income already too scanty, must render altogether intolerable that situation which is at present strewn with thorns. The consequence will be, that the few small estates which have been preserved (for many of them, on account of the pressure of narrow circumstances, have been already sold) will be very soon disposed of to rich mercantile men and nabobs, who are ambitious to purchase extensive domains. Small estates will be thus swallowed up and incorporated with larger: the valuable class of men above described will disappear; and haughty stewards, intoxicated with the power of delegated authority, will occupy their place. No one who has seen the deplorable change that has been effected, wherever a wealthy man has thus added field to field, and swallowed up estate after estate, will need to be reminded of the desolation and misery that this hath produced, a just picture of which, and not in the least exaggerated, he finds in Goldsmith's "*Deserted Village*." It is the contemplation of those evils which are the certain, and not the hypothetical consequence of this law, should it be persisted in, that makes me view it with a melancholy sensation not much differing from horror.

I cannot help, therefore, most earnestly wishing that some mode could be devised for warding off this too obvious calamity. Nor does it seem to be impossible to raise as much money as might be capable of effecting the purpose wanted by means that would be less objectionable. The theory of finance, though it has been long a study, seems not to have attained as yet to any thing like the perfection of which it is susceptible. No tax is so good, nor perhaps will ever be permanently so productive as it might be, if it does not at the same time operate as a regulation of police, that tends to preserve, if not to purify, the morals of the people, and to augment the general prosperity of individuals, not the prosperity of a particular class only: but at what period of time mankind at large will be sufficiently enlightened to be able to perceive this, no one can tell; certainly it will not be in our day. It will even perhaps admit of a doubt whether the principle of this bill should be admitted; but the time is not yet arrived in which this discussion would be attended to with patience.

An Apology for Ignorance.

To the Editor of Recreations in Agriculture, &c.

SIR,

IT may seem strange to offer an *apology* for *ignorance* in a work which professes to teach knowledge, and I therefore confess I have no reliance, for the admittance of this letter, but upon your candour, which I trust will ever be willing to hear both

sides of a question, as the most rational way of arriving at the truth.

I have read a great deal, Mr. Editor, in praise of knowledge. Almost every publication professes to deal in the article. Senates, colleges, schools, and seminaries of all descriptions, are instituted and upheld for the express purpose of diffusing it. To be possessed of it is reckoned the highest honour and ornament to the human character; to promote it, is among the most munificent services one can render to the public, and to honour and venerate men of knowledge has always been considered as an infallible proof of good sense. In short, all the world are agreed in bestowing the highest encomiums on knowledge, without paying the least attention to its near relation *ignorance*; for that there is a relationship between them, no person can affect to deny; and, if I mistake not, even the ancients allowed this.

But, sir, after all this *fuss* that is made about knowledge, it strikes me that one or two things are nevertheless true: first, that there is not so much knowledge in the world as some people suppose; and secondly, that the want of it, *alias* ignorance, is by no means to be deplored in the lamentable language some people make use of. That there is not so much knowledge in the world as commonly supposed, is too obvious to require illustration; but, as to the other position, that ignorance is not to be deplored, this may perhaps require that I should explain my meaning.

The fact is, sir, that after considering the subject very attentively, after revolving those vehicles of knowledge in my library, and then observing its prac-

tical effects in the world, I cannot bring myself to be of opinion that knowledge is a thing of such vast use as many people would fain have us to believe. I observe many hundreds of flourishing gentlemen in my neighbourhood, who continue mightily well to go on without it, and arrive at considerable honours and dignities. This is at least a negative proof against its utility; but, on the other hand, I observe a great many persons, to whose success in life it would be a positive obstruction; persons, sir, to whom ignorance is necessary; and who, whatever they may say, will never in their hearts join in the popular odium and dislike of ignorance, but must be conscious of its utility.

Do you, for example, suppose that ignorance is any prejudice to a *conceited man*? So far from it, that ignorance and conceit have been sworn brothers and inseparable companions since the world began. It is well known that conceitedness gives a man a certain degree of consequence, a commanding and imperious air, throws a degree of awe and reverence about him, establishes his opinions, and often procures him to be declared umpire in great and weighty disputes. But this pre-eminence would be destroyed by the absence of ignorance; his tone would be lowered, his voice faltering and depressed, and he would bring out his words with the sheepish modesty of a man who holds the despairing maxim *humanum est errare*, and therefore speaks with timid caution, and proposes what he does propose with humble deference. But such men, I need scarcely tell you, are not fit to shine and to make a figure; whereas the man of conceit, supported by ignorance only, may be a match for an university.

A second class of men, to whom ignorance is absolutely necessary, are those who possess *modest assurance*. The world, I know not why, have lately contracted these two words into one, *impudence*; which, for brevity's sake, I shall adopt, because I know it will not give more offence than the other; men of the cast I am speaking of not being very nice and touchy. Well, sir, with regard to the *impudentissimi*, have we not a proverb, that ignorance is likewise their faithful friend and inseparable companion? Impudence and ignorance, we say, and say justly, always go together; and while in the economy of society the former is tolerated, received into the *best* company, and often honoured and rewarded, why should we affect to condemn the latter? If a workman is skilful, why despise his tools? If a building stands firm, why cast reflections on its supporters? No, rather let us join the present subjects of my encomium, who respect the ignorance that enables them to shine, and, with fervent zeal, "praise the bridge that carries them safe over."

Between these two classes of men there will undoubtedly appear a great similarity, and it may be thought I ought to have classed them together; but in truth the conceited party are much inferior to the other, and seldom attain the same degree of eminence. Men of sheer impudence, and who have a stock of ignorance answerable to their daily consumption, are not to be defeated by common means; and they have this peculiar to themselves, that although incapable of proving what they say, they readily offer to *pay* for it: and here it is that among the many other obligations ignorance has laid us under, to her

matchless power we owe the frequent practice of ascertaining truth by a sum of money, *anglice*, a bet!

It might appear invidious were I to specify more *classes* of men to whom ignorance is of importance. I shall, therefore, in what is to follow, make my remarks of a more general kind. When I said above that I could never find out the vast use of knowledge, I had in my eye one subject which it will be allowed men in general have very much at heart, I mean the acquisition of riches. And here I should be glad to ask, how many well attested cases there are of men, in the way to wealth, who were let and hindered by ignorance? I question if many such cases can be produced. I will not guess at the number, but I will venture to bring ten to one which will establish my position, that in the acquisition of wealth, *ignorance*, if any, is a very trifling obstruction. Nor is this wonderful. Of what consequence in getting riches is it to be able to understand ancient or modern philosophy? It certainly would not advance a man's credit, that he was able to construe a difficult classic; nor does any man make a worse bargain for not being master of the propositions of Euclid. There never yet has been any very intimate connexion between knowledge and wealth, although an eminent philosopher somewhere asserts, that knowledge *is* wealth, which is just as much as to say, in the old song, "My mind to me a kingdom is," or, "I care for nobody, no, not I, if nobody cares for me." Nor do I see how such a connexion is likely to take place, unless universities were to become *banks*, and degrees were attainable by *dividend-warrants*.

But there is another case in which *ignorance* ap-

pears to have many advantages, or rather I should say, to bestow upon us great benefits, I mean in *conversation*. It has been lately observed that people fond of company are not so considerate of what they say, as desirous to have their share of *talk* at all events. Now in this predicament, with an extreme anxiety to speak, and great poverty of subject, it is obvious that ignorance must be of infinite utility. Without it, certainly, the affairs either of the nation, or of individuals, could not occupy a tenth of the time they now employ. Fatal will it be for lively and genteel society, if ever the time come when men shall mention only what they know, when events shall be thought incapable of embellishment, and the histories of families require no powers of imagination to illustrate them. Those, therefore, who are indebted to ignorance for the figure they make, and the reputation they acquire for conversation talents, ought not to be among the number who despise their best friend. Melancholy would be their case, were there any truth in what the facetious Henry Fielding somewhere asserts, that a man treats a subject the better for being in some degree acquainted with it.

Having thus demonstrated some of the principal advantages of ignorance, and shewn in how few cases it is of any detriment, I hope I shall hear that it is hereafter treated with more respect, and that no man shall be censured as an ignoramus, unless we know exactly what he is worth. Those who have arrived at all which this world can give, without knowledge, are not amenable to school rules. Speculations are not made on Parnassus, nor are the Muses to be courted in Threadneedle Street. Accumulation is the

business of arithmetic, not of grammar, and a man may be worth a plumb who would be blackballed in the Royal Society.

Lastly, in praise of ignorance, permit me to observe, that in many cases it has a positive preference to knowledge, as being much cheaper and less hazardous. Those who have acquired what is called knowledge of the world, at Newmarket, at Brooks's, at taverns, at theatres, in bagnios, and other schools of a like kind, are frequently willing to confess that it had been better for them to have remained in ignorance. The fact is, that many, in endeavouring to emerge from ignorance, as from a state of disgrace, have only gone from one extreme into another, and have at length landed in a neutral frame of mind in which neither knowledge nor ignorance could be distinguished.

Certain modern philosophers, or rather *philosophists*, have resolved all crimes into ignorance, a contrivance so very happy, that, unless a law was made against ignorance, we might soon be relieved from the whole tribe of gentlemen of the gown. The highwayman might then say, that he took a purse or a watch in *mere ignorance*; and the housebreaker, detected in packing up the plate and jewels, would be acquitted the moment he declared *he knew no better*. By the by, Mr. Editor, the doctrines of our modern philosophists seem to me to afford a very high encomium on ignorance, as a qualification they have long been striving to bring into fashion, and of which many of them are very brilliant examples. I am sir, yours,

AGNOIOS.

P. S. The lawyers have a saying, *ignorantia neminem excusat*; which, I believe, means, that ignorance is the best excuse for going to law!

To the Editor of Recreations in Agriculture, &c.

SIR,

I AM one of a numerous class of persons to whom your work will be peculiarly useful. Our time being principally occupied by the avocations of society, we have not leisure for entering deeply into literary pursuits; yet are so far in the habit of reading, as to find in our books a certain and never-fading source of entertainment for the short intervals of time that are not devoted to business or company. A consequence of this is, that we frequently meet with passages in authors which greatly excite our curiosity, though we must content ourselves with remaining unsatisfied, either on account of the smallness of our libraries, or the want of leisure to turn over volumes, if we happen to have them, in search of the desired information. Now, as the natural peculiarities of animals, plants, and minerals, form one of the principal classes of objects in which we find ourselves thus at a loss, I am in hopes that we shall obtain great relief from the perusal of your numbers as they come out; for they will, if I rightly understand your plan, point out such circumstances in Natural-history as, being interesting in themselves, we shall read with avidity, and retain in our memory; whereas the usual mode of going over a system of classification [I, however, beg to be understood that I approve very much

of the prevailing system when properly managed. I would have you to annex the technical descriptions and names, by way of identifying objects, in the same way as the longitude and latitude should accompany a geographical account of a place], involved in technical terms, is a drudgery to which none can submit but those who make the study of natural-history an occupation of itself, rather than a source of desirable information subservient to other purposes.

These remarks have been suggested by the following passage in Cesar. In reading a book which was written about eighteen hundred years ago by an accurate and intelligent man, we are naturally led to observe, with some attention, the changes that have taken place during that period in the countries of which it treats; accordingly the animals here described, amongst other things, excite a considerable degree of interest. When we attend to the geographical descriptions of this author, we are convinced of his accuracy in general, and are thereby led to give more credit to what is said respecting these creatures than perhaps we otherwise would; yet he may have been deceived by idle stories of the country people. At all events it will be very gratifying to your readers, if either you, or any of your correspondents, will furnish them with any authentic information on this subject that your extensive reading may have supplied.

After mentioning the Hercynian forest, a wood of an immense extent in the interior of Germany, he proceeds as follows (*de Bello Gallico*, lib. vi. c. 22, &c.) [N. B. The original text is omitted, as the reader, it is supposed, will be satisfied with the justness of the translation.]

“It is certain that there are many kinds of animals, natives of that place, which are not to be found elsewhere. The following are amongst those which differ most from others, and appear worthy of being recorded.

“There is a beeve (*bos*) of the form of a deer: from the middle of its forehead, betwixt the ears, springs a single horn, taller and more upright than any of the horns with which we are acquainted; and wide branches spread out at the top of it something like palm leaves. The appearance of the male and that of the female are alike; as also the shape and size of the horns.

“There are also creatures called *alceses* (*alces*). In shape and in the colour of the skin they very much resemble goats; but rather exceed them in size; they have no horns, and their legs are without joints. They do not lie down to take their rest; neither if, through any casual distress, they lay themselves on the ground, can they again raise themselves or stand up. Trees serve them for beds; to these they apply their bodies, and rest themselves by leaning against them. The hunters, having remarked by the tracks of their feet the places which they frequent, either dig out the trees at the roots, or cut them across to such a degree that they only remain in appearance standing. Thus when they come to lean as usual, the wounded trees give way with the weight of their bodies, and they fall to the ground.

“There is a third sort, which is called the *urus*. It is in size rather less than the elephant; in appearance, colour, and shape, it is like a bull. It is both very strong and fleet, and it spares neither man nor beast when it meets with him. The country people destroy

them by catching them in pit-falls. The youth render themselves hardy by this sort of labour, and exercise themselves in this mode of hunting; and those who have killed the greatest number acquire great praise, the horns being produced in public as a proof. They cannot be tamed or domesticated, even though taken when very young. The size, shape, and appearance of the horns differ greatly from those of our cattle; the people seek eagerly after them, and, encircling the mouths with silver, use them for drinking cups at their great festivals."

This last has been probably merely a breed of common cattle, and may have been domesticated and intermixed with the others, notwithstanding what is said to the contrary; for ignorant people do not always try every means of making animals subservient to their own purposes; an instance of which we have in Mr. Park's travels, lately published; wherein we are informed, that the Africans laughed at him as an impostor when he told them that he had seen elephants used as beasts of burden.

I believe there are many certain proofs of different kinds of animals having existed which are not now to be found in the world; of these, I presume, you will take due notice in the course of your work. In the mean time any intelligence you can give us respecting the above will be obliging

A. A. L.

In answer to the above, the Editor shall only say, that there is reason to suspect that Cæsar, like many other travellers, has taken his description of these animals from the report of the natives. The two first,

there is great reason to suspect, are merely ideal animals, as they have not, that we have heard of, been ever since seen. The story of the legs without joints, &c. is to this hour reported of the elephant, and firmly believed by the vulgar in this country. As to the urus, the animal still exists in the province of Lithuania; and, though the description be somewhat exaggerated, it is doubtless the largest of the *bos* tribe that is known in Europe. It can be easily tamed. Many horns of this species have been found at different times in the bogs of Ireland and Scotland of very large dimensions; which affords sufficient evidence that it has, in former times, been a native of these islands, though it has been here long extinct.

To the Editor of Recreations in Agriculture, &c.

MR. EDITOR,

I DO not disapprove your caution respecting the admission of poetry into your miscellany. Perhaps it is right that you should adopt strong measures to guard against trifling verses being poured in upon you; but I beg leave to suggest that it might perhaps be agreeable to many of your readers, if you would admit sparingly a selection of some of the best little poems that have been published, though not so generally known as they deserve to be. This might conveniently enough fill up a spare corner of your miscellany, at times afford an agreeable recreation to many of your readers, and would give some idea to those who wish to send you original poetical

effusions, of the kind of poetry you would approve. It was evidently with that view the address to the Crocus was inserted in your last; with the same design I have transcribed the following verses from a respectable publication that has lately made its appearance, as the perusal of it threw me into a state of sober sedateness that was pleasing to me, and I thought it might not perhaps prove unacceptable to you. If you shall think it worthy of insertion, it will afford a sensible gratification to

A CONSTANT READER.

*An Ode to the River Cam, by Mr. George Dyer.
From the Annual Anthology, just published.*

I.

While yon sky-lark warbles high,
While yon rustic whistles gay,
On thy banks, oh! Cam, I lie;
Museful pour the pensive lay.
Willowy Cam, thy lingering stream
Suits too well the thoughtful breast;
Languor here might love to dream,
Sorrow here might sigh to rest.

II.

Near yon steeple's tapering height,*
Beauteous *Julia*,† thou art laid;
I could linger through the night,
Still to mourn thee, lovely maid!

* Chesterton Church, near Cambridge.

† The young woman, on occasion of whose death was written *Elegy* the second, in the Author's *Poems* published in 1792.

An Ode to the River Cam.

In yon garden Fancy reads,
 " *Sophron** strays no longer here ;"
 Then again my bosom bleeds ;
 Then I drop the silent tear.

III.

Hoary Cam ! steal slow along !
 Near yon desolated grove
 Sleep the partners of my song ;
 There with them I wont to rove.
 He, the Youth† of fairest fame,
 Hasten'd to an early tomb ;
 Friendship shall record his name,
 Pity mourn his hapless doom.

IV.

Hark ! I hear the death-bell sound !
 There another spirit fled !
 Still mine ears the tidings wound ;
Philo‡ slumbers with the dead.
 Well he knew the Critic's part ;
 Shakespeare's name to him was dear ;
 Kind and gentle was his heart ;
 —Now again I drop the tear.

V.

Bending sad beside thy stream,
 While I heave the frequent sigh,
 Do thy rippling waters gleam,
 Sympathetic murmuring by ?
 Then, oh ! Cam, will I return,
 Hail thy soothing stream again,

* Robert Robinson, author of various ingenious and learned publications, whose memoirs were written by the author, resided in this village.

† William Taylor, formerly fellow of Emanuel College; the most intimate and highly esteemed of the author's friends when at College: and if extensive learning, a sound judgment, a modest demeanor, and unblemished morals, have a claim to respectful remembrance, William Taylor will not be soon forgotten by him.

‡ Dr. Farmer.

And as viewing *Julia's* urn,
Grateful blest thee in my strain.

VI.

Still there are who raptur'd view
Scenes which youthful hopes endear,
Where they science learn to woo;
Still they love to wander here.
Peace they meet in every grove;
Lives again the rapturous song;
Sweetly sportive still they rove,
Cam! thy sedgy banks along.

VII.

Stately streams, and glens, and lakes,
They can leave to *Scotia's* plains;
Mountains hoar, and vales, and brakes,
They resign to *Cambrian* swains.
But these placid scenes full well
Suit the quiet musing breast;
Here if Fancy may not dwell,
Science shall delight to rest.

To the Editor of Recreations in Agriculture, &c.

SIR,

THE enclosed I met with in an old magazine the other day; if you can give any satisfactory explanation of it, as I do not recollect seeing any account of it before, it would be esteemed a favour, and I hope would not interfere with the plan of your work. I am, sir, your constant reader,

A. B.

“The inhabitants of St. Lucia have discovered an animal flower. In a cavern of that island near the sea, is a large bason from twelve to fifteen feet deep,

the water of which is very brackish, and the bottom composed of rock, from whence proceed certain substances which present, at first sight, beautiful flowers of a bright shining colour, and pretty nearly resembling our single marygold, only that their tint is more lively. Whenever they attempt to gather these seeming flowers, as soon as the hand, or instrument, is within two or three feet of them they shut up, and plunge themselves under the water. When any of them are taken out of the crevices of the rock, new ones in a short time spring up in their stead. On examining this substance closely, they find in the middle of the disk four brown filaments, resembling a spider's leg, and which move around a kind of yellow petals, with a pretty brisk and spontaneous motion. These legs reunite like pincers to seize their prey; and the yellow petals immediately close to shut up that prey, so as that it cannot escape. Under this appearance of the flower is a brown stalk of the bigness of a raven's tail, and which appears to be the body of some animal. It is probable that it lives on the spawn of fish, and the small insects which the sea throws up into this part of the salt water."

The above is the sea anemone [mentioned in the Natural-history, page 3, vol. i.], an animal of the polypus tribe, so called from the resemblance it bears to the flower of that name.

EDITOR.

[*The ingenious dissertation of ARRA came too late for this number: it shall appear in our next. Other Acknowledgments are deferred for want of room.*]

RECREATIONS, &c.

AGRICULTURE.

Hints respecting the circumstances that require to be chiefly adverted to in experimental agriculture, particularly with a view to a proposal for instituting a national experimental farm.

[Continued from page 20.]

ON THE VARIETIES OF THE SHEEP KIND.

THE sheep is an animal that has been so long domesticated in Europe, and the mongrels that have been produced by various intermixtures of different breeds are so numerous, that we shall have perhaps more difficulty in tracing out the natural varieties than in most cases. This difficulty will be the greater, on account of its being now only for the first time attempted: for, as naturalists have in general supposed that all the diversities of this creature that fell in their way were only casual, and not permanent varieties, they have been at little pains to examine them with that discriminative accuracy which was necessary to describe them properly; besides, the peculiarities that are of the greatest importance to the agriculturist, are

frequently of no sort of moment in the eye of the naturalist, so that they are overlooked or despised. Thus am I left to begin an exploratory agricultural excursion in a region nearly unknown, without chart or compass to assist me; nothing, therefore, can be expected but a feeble beginning, which, if pursued by others, may perhaps lead to important discoveries. In the present state of our knowledge, perhaps, the highest attainment we can hope will be to guard from error.

It is unnecessary for me to attempt a systematic description of the sheep; for the animal is so well known, as to be at once recognised by its name alone. Had I indeed attempted a description, I should have been at some loss to do it in a satisfactory manner; for I find that I must have rejected that peculiarity which persons in general would deem its most essential characteristic, that of a *wool-bearing* animal. I have met with several varieties of sheep that carry no sort of wool, nor hair, that could in any way be applied to the same purposes with wool. This is a fact which, to most persons, will be so unexpected, and in its application to the purposes of life will admit of inferences so important, that it ought not to be passed over lightly.

The first sheep that I ever saw possessing this peculiarity was on board a Danish East Indiaman that put into Leith roads in the year 1794. It was of a large size, and comely make. The whole body was covered over with a close coat of short, stiff, glossy hair, of a clear nut-brown colour, very much resembling the coat of a well-dressed running horse. The

animal was, in all other respects, a sheep, having like habits and propensities as the other sheep with which it associated in the ship; of these there were two or three left, which carried wool of the same sort with that common in Europe. On inquiry, I found that the wool-bearing sheep had been brought from Madras, and that the bare sheep had been taken in, with some others of the same sort, at the island of Madagascar. This fact appeared to me so curious, that I soon afterwards mentioned it in a letter which I had occasion to write to Sir Joseph Banks, Bart. President of the Royal Society, who, in return, said that it was nothing new to him; for that a considerable time ago he had had three sheep of a similar sort sent him from *Spain*, that he had kept them for several years in Lincolnshire, and that they never carried more wool than his *coach horses*. I afterwards mentioned these facts in the Royal Society of Edinburgh, where Dr. William Wright, who had lived many years in Jamaica, and had visited most of the West Indian islands, assured me that he had found a breed of sheep possessing exactly the same peculiarity in the island of St. Vincent's. Since that time I have myself found another sheep of the same kind grazing in a field near Dulwich, in Kent, of a brown and white colour mottled, without having been able to learn whence it came. I found a third sheep of the same sort at Liverpool, in June 1797. It was a beautiful lively looking creature, of a jet black colour, with short, smooth, glossy hair. I was told it had been brought thither from some part of the coast of Africa. These facts sufficiently show that several breeds of sheep, which bear no wool (for

they were each different from the other), do actually exist, and that they are by no means uncommon. That these breeds of sheep should not be propagated in cold climates, is nothing extraordinary; but that they should not have been at all known, nor adverted to, is rather a singularity. This, then, is at least *one* original variety totally different from any of those that have been reared in Europe; and that this peculiarity does not originate from the climate, or other lesser circumstances, is very obvious from the facts above stated; for wool-bearing sheep, we see, are produced in the warm regions of India, as well as in Europe; and this breed is equally bare of wool in England as in Madagascar. What are the other qualities of this sheep are unknown.

Another, and a distinct variety of sheep has been found by Dr. Pallas in the eastern parts of Asia in a wild state, which is there known by the name of *Argali*. This is a strong, active, and nimble animal. In regard to its fleece, it is different from the European and the Madagascar sheep. The principal mass of that fleece is a long shaggy hair, of a coarse quality; but among the roots of that hair is found a considerable quantity of short, fine, soft wool, which, when separated from the hair, may be wrought up in manufactures of a very fine quality. Of the sheep of this variety I have heard of no specimens in Europe.

The third distinct variety of sheep, of which I have obtained exact information, was found in the island of Jamaica, and is esteemed a native of that island. For the knowledge of it I am indebted to Sir Joseph



H. Swale del.

THE ARAGLI, OR WILD SHEEP OF PALLAS.



Banks. "Yesterday," says he, in his letter, dated October 1795, "I went to visit a friend of mine who is just returned from Jamaica. On going up to his door, I observed a sheep of an uncommon appearance; and, on inquiring what kind of sheep it was, he told me it was one of the native sheep of Jamaica that had been taken in at that island for live stock for the ship's company, but had been saved in consequence of a quick passage. On my expressing a wish to see the nature of its wool, he said that it carried no wool, but only a particular kind of hair. Still expressing a desire to see the nature of the fleece, whatever it was, he walked up to the sheep, which, being perfectly tame, stood still till he plucked a lock from its back between his finger and thumb. On looking attentively at this lock, he expressed a great degree of astonishment to find that about two thirds of the whole was a very fine wool; for, although he had lived in Jamaica about twenty years, and had seen the sheep of the same kind times innumerable, he had always been told that they carried no wool, and believed it without examination; he was now, for the first time, convinced that he had been in a mistake." Sir Joseph sent the lock of wool to me exactly as he had received it, desiring I would take notice of the hair among the wool, as he thought it was of a very singular kind. I did so, and found that the hair was every where about half an inch longer than the wool, so as to cover and hide it entirely. This hair was not of the rough shaggy sort, but exactly even and regular in the points. Each individual hair was smaller at the root than the point, and was marked crossways by alternate rings of black

and white, so as to assume a greyish colour, much like the hair of the badger. It was stiff, and a little glossy. The *wool* (which could have been easily freed from the hair merely by plucking it out, as it is all uniformly longer than the wool) was short, but thick, and remarkably soft and fine. It was finer than the finest Spanish wool I had seen, and perhaps as soft as Shetland wool; so that it would have afforded a valuable article to the hat-maker in that state; or to the clothier when it had attained its full growth in the month of June. This is evidently another distinct variety of sheep, which is totally unknown to practical farmers in Britain.

It is an opinion commonly received, and it has been confidently asserted to me as an undoubted fact times innumerable, that when British sheep are carried to the West Indies, they quickly lose their wool, and become covered with hair; and I make no doubt but most persons in good earnest believe that the very sheep I have just described are the degenerated progeny of English sheep. Those who have not been accustomed to accurate investigation will be apt to be imposed upon by such confident assertions; with me, who have often interrogated the persons that have made these assertions in the most unqualified manner, and never found one who had made the examination with such accuracy as could enable them to decide, they bear no sort of weight. Doctor Wright, before quoted, on whose accuracy I could more rely than on most others, has informed me, that he has frequently examined the English sheep that have come over, and assures me that they carry wool of the same kind in

Jamaica as in England; but he justly remarked, that many circumstances may concur to make an inattentive observer believe that the wool falls, and hair comes in its stead, particularly the circumstance of their never shearing their sheep in the West Indies; for, as wool is there of no value, it is suffered to hang upon the sheep till it loosens from the skin and falls off of itself; but when this does happen, wherever there chances to be any of that kind of hair, *sui generis*, among the wool, which is known in Britain by the name of *Kemps*, and in France by that of *Jarre*, this hair remains attached to the skin when the wool falls off, and of course the wool, at that particular time, seems to have disappeared, and hair to have come in its stead. A single observation of this kind being once made by two or three persons of credit, and confidently asserted by them, will be amply sufficient to give currency to any opinion that appears to have a spice of the marvellous in it; but, when we take into the consideration along with it, that should any of the few ewes that are carried from Britain chance to have a lamb, and should it also be found that the fleece of that lamb was, in some degree, approaching to the nature of that of the native sheep, and that the descendants of that lamb in a few years could not be distinguished from the native sheep, this would be deemed a *confirmation strong as holy writ*, that British sheep had been transformed, by the influence of the climate, into those West Indian hairy sheep; though in this instance the change, to any intelligent man, must unavoidably have taken place, whatever was the nature of the climate, merely by

the debasement effected by mongrel intermixture of blood.

Not satisfied with reasoning, however, on this point, I wished to have the fact ascertained by actual trial; and with that view I requested an acquaintance, on whose attention I could rely, and who went out to Jamaica in the year 1797, to be so obliging as to send home to me a lock of wool, to be plucked by him from the first English sheep he should find pasturing in Jamaica. This he did; and I have now in my possession this lock of wool, which I have showed to many persons, all of whom agreed that it was exactly the same as English wool in every respect.

I now return to the Jamaica sheep, and beg leave to remark by what a lucky accident the visit of Sir Joseph Banks counteracted the effect of a circumstance which, if it had not been adverted to, would have established error under the sanction of what would have been deemed a most unexceptionable experiment. Had the sheep been allowed to remain on British pasture through the winter, and had it come to be shorn along with others next season, the shearers must have remarked the great quantity of fine wool intermixed with the hair. Had this been mentioned to the owner, he would have been ready to make oath, if required, that such sheep never did carry one particle of wool in Jamaica; of course it would have been concluded that this must have been occasioned by the influence of the climate of Britain, which had changed the hair into wool after it had reached this island. Nothing can be seemingly more fair than this conclusion would have been; but the sheep having been examined im-

mediately on its arrival in this island, set aside the fact on which the fallacy rested. Innumerable are the errors that have been propagated by experiments thus carelessly conducted, so that too much care cannot be taken to guard against them.

Another variety of sheep found at the Cape of Good Hope, and in many other parts of Africa and Asia, differs entirely from any of the breeds reared in Britain by its broad and weighty tail. I have seen one or two of these in this country, in which they prosper equally well with our own sheep. Their wool was of a quality nearly similar to many varieties of British sheep; but what I saw was much mixed with the hair called kemps. We know that this is not a characteristic peculiarity of this breed, which probably admits of as great a diversity in point of fleece as the round-tailed sort; but we know too little of this kind to be able to speak with certainty concerning it.

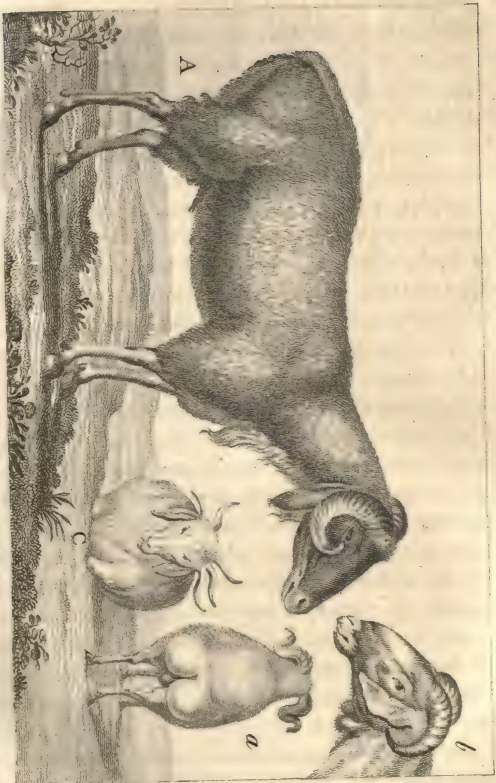
Dr. Pallas has described a variety of sheep nearly allied to the above, which he calls the *steutopygo*, or fat rumped sheep; the distinguishing peculiarity of which are two lumps of fat of a particular quality upon the buttocks. These lumps of fat are said to assume the form of a hemisphere, and to weigh sometimes twenty pounds each. This breed of sheep is as general over the whole eastern part of Asia, as the round-tailed wool-bearing sheep is in the western parts of Europe. It is a large strong bodied sheep; but with its peculiar qualities we are as yet so much unacquainted, as to be able to speak of it with no degree of certainty.

Dr. Pallas remarks, that the wool of the Bocharian

sheep, which is the most distinguished variety of this breed, is very soft and fine; and the furs made of the lambs skins of this breed, when properly prepared, are extremely beautiful, and sell at a high price. I was at some pains to get a sight of some of these furs; and at length, with some difficulty, effected it. I then found that what Dr. Pallas calls *wool*, is, properly speaking, a very fine soft and silky hair, gently waved; and more resembling the hair of some kind of dogs, than any thing else I have ever seen. This, then, is a variety which, in point of fleece, is entirely different from any of those we have as yet noticed; and abundantly proves that the bearing of *wool* is by no means a characteristic mark of the sheep kind.

In the northern parts of Russia and Finland is reared a breed of sheep whose fleece, under the name of *wool*, consists entirely of a long and strong kind of hair, growing thick over the whole body. The natives have, with good reason, preferred this breed of sheep to those carrying wool; for as these skins, dressed as furs with the fleece on, are made use of by the natives in that state for a kind of dress called *shube*, with the hairy side inward, to keep them warm in winter, they find that this kind of hair adheres more firmly to the skin than *wool*, and that, of course, it lasts with them much longer than that would do. Wool-bearing sheep, therefore, are neglected in those regions.

I once had occasion to see a parcel of sheep-skins that had been sent from Hamburgh to Leith, with the fleece on. Some of these bore a good close kind of wool; but the greater part were of the hairy sort,



THE STEATOPYGA OR FAT PUMPED SHEEP OF PALLAS:

A, a side view of a Karaguse Ram of this breed. B, also seen behind, showing the Trepygium. C, One of the same, with two Novecola hanging at the neck. — C, One with five horns.



clear, glossy, and waved. This shows that the two breeds are contiguous, and probably intermixed as in Britain.

It was by attending to these facts that my notice was first directed to the discriminating between wool and hair in the fleeces of sheep; a thing that, before that period, I had never suspected to be in the least necessary; as I believed that every fleece of a sheep consisted of wool, unless in as far as it was intermixed with kemps; and that what was called hairy wool was nothing but coarse wool. I have now reason to believe, that there are some characteristic distinctions between hair and wool, that are unconnected with the fineness or the shortness of either; but I have not yet been able to collect all the facts that are necessary to procure certainty on this head.

The distinguishing characteristics between hair and wool, in the present state of my knowledge, appear to be these: wool seems to be more elastic and flexible than hair; it is also more liable to be contracted in length by various natural crumplings or bendings; but in this respect there is a great diversity of degrees. Wool is, in general, finer in the pile than hair; but this is by no means without exception. Wool, when of a considerable degree of fineness, is, in general, softer to the feel, and hair more silky; but to this rule Spanish wool is a singular exception; for it is always harder than any hair or wool of the same fineness; and Shetland wool is an exception on the other side; for it is greatly softer than any other wool or hair that I have seen, when nearly of the same degree of fineness. The coarsest Shetland wool I have seen is

softer than the finest Spanish, though perhaps one filament of the Shetland would be equal in thickness to six of the Spanish. But the most characteristical distinction that I have remarked respects the manner in which the filament is affected by the weather during the time of its growth; for, with regard to wool, heat tends to augment the size of that part of the filament which was protruded from the skin at the time it was produced, and cold to diminish it; insomuch that sometimes the point, and sometimes the root of the wool will be thickest, though in general, in this climate, the wool of aged sheep will be thicker at the point than towards the root: but I have never yet had any reason to think that the heat or cold affected the thickness of the hair, as it appears to me always to retain the same shape, whatever has been the nature of the season. In general the root end of the hair is thicker than the points; but in the hair found among the wool of the Jamaica sheep this rule is reversed, as the points of that hair were perceptibly thicker than the roots.

The experiments by which these facts (respecting the variation of the thickness of the filament of wool by means of heat or cold) were ascertained, were detailed at considerable length in a book entitled, "*Observations on the Means of exciting a Spirit of National Industry*," published by me about twenty years ago. At that time I had no suspicion that the fleece of any kind of sheep was not invariably wool, and therefore I supposed the observations would apply alike to the whole. I have now discovered my mistake, and suspect that I have not yet discovered the

whole extent of it. What the difference may be between *hair* and *wool* in different manufactures has never, that I know of, been ascertained; but it is probably considerable in some respects. Experiments are here also wanted.

One obvious circumstance which characterises *wool* from *hair* is, that wool loosens from the skin nearly all at one time; and if it be not shorn about that period, it soon falls off in large masses, the young wool being sprung to some length before this takes place. Hence it happens, that the time of sheep-shearing, where these wool-bearing sheep are reared, is not entirely at the option of the owner, but must, in some measure, be regulated by the state of the fleece. If this operation be attempted too soon, before the young wool has begun to spring, it cannot be easily performed, and the body is left too bare; and, if it be too long delayed, the young wool is too far advanced, and chokes the shears, so as to retard the operation, and damage the wool; for all the new wool that is thus cut off goes for nothing, and is lost. On the other hand, when the fleece consists of hair, it does not seem to rise from the skin so regularly as the wool; and therefore the time for shearing, not being naturally denoted by any unequivocal marks, is more in the power of the owner either to forward or to postpone at pleasure, as circumstances shall seem to indicate.

As this is a peculiarity respecting the fleeces of sheep that has never before, to my knowledge, been remarked; and as it serves to point out peculiarities of breed that have not been observed, the attending to it

may possibly, in time, be productive of consequences that have not been foreseen.

Of the wool-bearing breeds of sheep, the two kinds that are the best known to me are the Spanish, and the Shetland breed. Spanish wool has been long known as the finest short wool for making cloth. It is very hard in proportion to its fineness, and is, in every respect, well fitted for making cloth that requires to be fulled; and perhaps the crispness of this wool is beneficial for that purpose. The Shetland breed of sheep carries the *softest* wool of any that is as yet known. These two characteristics are so striking in regard to the two kinds of wool here mentioned, that no person who has the sense of feeling with his fingers could ever be at a loss to distinguish them by the slightest touch. Nor does this softness of touch in the Shetland wool depend entirely upon the fineness of the filament; for even the coarsest wool of that sort is softer than the finest of the Spanish, though the pile of the first should be very much coarser than that of the last. It is however, I believe, a never-failing rule, that in wool of the same sort, the coarsest is invariably the hardest also. These considerations make me conclude, that the animals which produce these two kinds of wool are distinct original varieties, which cannot be lost but by an intermixture of blood producing mongrel breeds, which may be varied to infinity.

[To be continued.]

NATURAL HISTORY.

On the various ways adopted by nature for the propagation and preservation of animated beings.

[Continued from page 40.]

IN all the animals hitherto mentioned, the male and the female are distinct creatures: but the common earth-worm affords an exception to this rule; for each individual worm is both male and female, though there can be no progeny ever produced without the concurrence of two individuals; in this case both become mothers at the same time. The earth-worm is an oviparous creature.

This is also the case with the snail. All snails are capable of producing young; and in most of the varieties they are males also; but they differ in some particulars from the worm. In some classes two, and in some three must co-operate before a perfect egg can be produced.

Hitherto we have no creature noticed that is capable of producing young without the concurrence of the male. But the *Aphides*, pucerons, vine-fretters, or wood-lice, as they have been differently called, a numerous class of small insects, afford an example of a mode of procreation different from any of these. It has been now fully ascertained by a variety of experiments, that

during the early part of the season this insect is universally viviparous; and that during this period every individual that hath been yet discovered is a female, that the progeny of all of these are prolific, and in a very short time after their birth produce young, which, in their turn, become mothers, as the former. In this way it has been ascertained that, beginning with those first bred in the spring, ten successive generations at least have been obtained from one mother, all of which were alike productive, and all viviparous, without the appearance of a single male among them. This circumstance, to those who have never examined the book of nature, would appear a very surprising phenomenon; but we do not stop here. As the season advances, and when the succulent food that is so necessary for the subsistence of these young creatures begins to fail, a few males are produced among the females; and after these have attained that state of perfection in which they are capable of performing all their functions, the females ceasing to be viviparous, no more young in their living state are then produced. The females, from that time, becoming oviparous, deposit their eggs in crannies, where they are preserved without hatching during the winter season. Thus is the existence of the race continued from year to year, long after the whole of the parents have been for ever deprived of life. The young are hatched in the spring as soon as the heat of the season is such as to produce leaves, on which alone they can find subsistence. If the season after they are hatched shall continue mild throughout, these insects produce their young invariably females as before, and thus go on multiplying

with astonishing rapidity; but should it continue so long mild as to have hatched the greatest part of the eggs, and should a series of very inclement weather succeed, the whole race are nearly destroyed at once; and in this way it sometimes happens that several years will elapse before they can become equally numerous as usual.

The diversities that take place in regard to the generation of the smaller insects are extremely numerous, and many of them still more unlike to what happens in respect to the larger animals than any thing we have yet had occasion to notice. About forty years ago, Mr. Bonnet of Geneva, discovered, that there are many varieties of vermiform insects which are not killed by being cut asunder; but that, on the contrary, they may be easily multiplied by this means. To this class belongs the earth-worm; for although this insect propagates naturally by means of eggs, yet it has been found that, if one of this species be divided into two parts, each of these in a short time will become a perfect animal; the tail part generating a head, and the head part generating a tail, so as to form two distinct animated beings. This seems to have been a provision of nature, kindly intended to preserve from unnecessary destruction a helpless creature, which, from its form and manner of living, is more frequently liable to be cut asunder by the ordinary operations necessary for dividing the soil, than any other creature whatever.

But though the earth-worm is not destroyed by a single amputation, yet it evidently suffers considerably from the operation, and recovers from it slowly;

and, if it be more than once divided, it usually perishes under the operation.

There are, however, other vermiform insects that live in water, which are so tenacious of life as to admit of being divided into many parts without danger, each of which so quickly acquires all the parts of the perfect animal, as to admit of being multiplied in this way with the greatest facility. A very small worm of this sort being cut into twenty-six parts, which were little bigger than so many atoms, the form of which could be barely perceptible by the naked eye, were in a few days converted each into a complete and perfect animal, capable of performing all the functions that belong to others of the same species.

To those who have examined this insect, and have observed that an intestinal canal seemingly undivided, and vessels which circulate fluids similar in destination to that of the blood vessels of larger animals, run through the whole length of the body of this little creature, nothing could seem to be more contrary to the general laws of nature; nor could we seemingly have devised a more likely way of putting a period to its existence, instead of multiplying it, than by thus cutting it into atoms. But here, as in every step of our progress, the weakness of our understanding becomes apparent, and also the folly of thinking that our finite comprehension can form an idea of infinite power.

Not only are many animals endowed with the faculty of thus sustaining, without any sensible injury, wounds which would prove altogether destructive to others; but it has even been ordained, that some of these should have no other means of propagating their

kind than a natural division, similar to that which we have just seen can be safely effected by art. How many creatures exist in this universe that can be thus propagated, has not been as yet in any wise ascertained; but they are perhaps equal in number to the larger animals with which we are acquainted; and perhaps a greater diversity also takes place in regard to the mode in which this separation is effected, than we have hitherto observed respecting the production of the young of other animals. I shall briefly specify a few of those diversities that have been hitherto remarked.

Among long and vermiform animals, which are propagated by a natural division, it usually happens, that the first symptom of an approaching partition (for so it ought to be called instead of parturition) is a small mark, which is observed to surround the body towards the middle of it. At the beginning that mark is scarcely perceptible; but it quickly becomes more apparent; the body contracting, in that place, as if it were tightened by means of a small hair surrounding it. This becomes closer and more close every hour, without however affecting the circulation of the fluids through the whole body (which, in many cases, is so transparent, as to render that plainly perceptible), until it is drawn quite close, when by a sudden jerk the total separation is effected; soon after which the tail part generates a head, and the head part a tail, and each becomes a perfect animal, which, in a short time, divides in the same manner, and so on *ad infinitum*: nor can it be easily conceived with what rapidity many animals belonging to this class are thus multiplied.

This kind of natural division is by no means confined to worms, or animals without feet. There is a species of milliped with a long horn-like substance on its head resembling a dart, which Bonnet described as belonging to this class, but which, having been observed more carefully by Muller, the celebrated Danish naturalist, and particularly described by him under the name of the *Naiad*, as it exhibits some phenomena of a very singular kind, I shall, for the satisfaction of the reader, give an account of as nearly in his own words as I can translate them.

“The body of a virgin Naiad,” says he, “is composed of sixteen rings; and we can reckon twenty limbs. The last ring is the longest of all: it is also more remarkable by the admirable productions which are there effected.

“If you attend to the naiad for some days, you will see transverse lines appear in this latter ring to the number of ten or twelve. You will soon perceive that these are new rings, which develope themselves within the ancient ring. They are enclosed under the skin of the mother naiad, the transparency of which allows them to be distinguished. By and by, the growing limbs are perceived; and the alternate movements of contraction and dilatation of the grand artery are there very sensible. The liquor analogous to the blood circulates in this insect, as in many others, from the tail towards the head.

“The new limbs soon begin to show themselves distinctly, one after the other. These rings lengthen and grow into shape. It is a little naiad which begins to be developed, and which has already attained a considerable growth.

“ While that marvellous developement goes forward, you can discover beyond the middle of the last ring of the mother, or that ring which becomes itself a naiad, a transverse blackish line, very different from that which characterises the new rings. It announces the near appearance of the dart, or rather the antenna, with which the little naiad ought to be provided. This antenna lengthens, and grows thicker from day to day.

“ Lastly, within the transverse ray appear two black points. These are the eyes of the growing naiad.

“ At this epocha the ancient naiad is become a mother, and you may see her swim for some time with her daughter, making both together only one body. My reader, in all probability, imagines that she is about to separate from her mother, and that here the multiplication of our milliped is to stop: not so; this multiplication has many other singularities to offer to us, which I shall content myself with slightly indicating.

“ While the young naiad developes herself in the last ring of her mother, you may observe, at the anterior part of that ring, transversal marks, weak at first, and very near to each other. This is a second generation which begins to develope itself, and in which one perceives the indication of new rings. These rings grow by little and little, as those of the first generation. They all develope then at once; but those of the second generation ought to arrive later at their perfect growth than the first.

“ Scarcely has the second generation attained the length of two ordinary rings, when a third generation

appears, the developement of which follows the same laws with those of the two first. It even sometimes happens, that the first rudiments of a fourth generation may be perceived.

“ Thus a naiad in full multiplication may be the mother at one time of four different naiads of different ages; and, what is more astonishing, the young naiads produce others, even while they still are contained in their mother. This mother, then, supports at once her children and her grandchildren; and, what is worthy of remark, all these successive generations form only one organic whole with the mother, or the grandmother. They all have only the same mouth, the same anus, the same artery, the same intestinal canal, &c. I know nothing more proper than this community of viscera to make us feel strongly, that there is not here a generation properly so called, but that the whole resolves itself into a simple developement of parts pre-existing in the naiads, which appear successively, and in a certain order.

“ When the first generation hath acquired all the parts which characterise the species, and that these parts have only to attain the full growth which is suitable to the species, the moment is arrived when that generation should separate from the mother. This is operated merely by some particular movements of the mother and her progeny. There is formed at the part where the separation is to take place a kind of stricture, which becomes more constricted every moment; and, when the daughter comes thus to adhere to the mother only by a very slender thread, the smallest movement completes the separation.

“ When the naiad is at liberty, the traces of the ancient intestinal canal, which still exists in the head, are effaced, and the dart, or antenna, becomes longer and stronger.

“ In separating from the mother the new naiad carries along with her the ancient anus, and all the generations which have begun to be developed. But then the last ring of the mother reproduces a new anus. The great artery also repairs itself; it collects the blood, and continues to push it from the last ring towards the first.

“ The naiad, whose history I sketch, has yet another manner of multiplying. Toward the third part of the length of the body is developed a new organic whole, without our being able to perceive the smallest mark of those transversal lines which characterise the first manner of multiplying. We do not even perceive the least indication of a new head. One would only say, that the naiad augmented her length considerably; and that in place of sixteen rings, sometimes thirty or forty may be counted. But by and by, the transverse blackish ray, of which I have spoken, can be perceived; the dart, or antenna, appears; the eyes can be perceived, and the naiad divides in two toward the middle of its length.

“ There is this difference, then, between the ordinary multiplication, and that which I have just described: that in the first, the head is developed at the same time with the other parts; whereas in the second, it only begins to show itself when the other parts have attained nearly their perfect growth.

“ This admirable naiad may also be multiplied by

cuttings, which reproduce the parts that they have lost. If the head be cut off when it is in full multiplication, a new head is produced; and the new generations which are going forward in the last ring of her body, cease not to proceed in their developement. The artificial multiplication goes forward even quicker than the natural. Twelve days are required to produce the first generation of a naiad; three or four only are required for the reproduction of a head or a tail."

Among those minute beings which are called *animalcula infusoria*, whose history has only of late begun to be studied, we meet with great diversities in respect to their mode of propagation. Nearly every individual among these diminutive creatures is the same in as far as respects the mode of producing young; and, in as far as hath been hitherto observed, without requiring the concurrence of any other individual: so that those who were to form their ideas of generation from what they observe among these numerous classes of animated nature, would differ intirely from those who adopted their notions from what is known to take place among the larger animals on this globe; among which there is not a single species to be found which does not admit of the distinctions of sex. What a lesson of caution ought this to give to those who pretend to judge of the possibility of things which they know not, by reasoning from the analogy of those few things they have had occasion to observe!

The *animalcula infusoria* are, in general, so small as to elude the naked eye; and what renders them the less perceptible is, that their bodies usually consist of a soft gelatinous matter, that is very slightly tinged

with any colour, and often so transparent, as to render conspicuous what passes within them when any opaque object chances to be there.

One other law which admits of no exception that hath hitherto been observed respecting these diminutive beings is, that in whatever way they are severally propagated, no individual has ever been observed to deviate from that mode of propagation that is peculiar to the species to which it belongs; and the same undeviating uniformity is found to take place in regard to this particular among the smallest of animated beings, as among the largest that move upon our globe; so that every idea of spontaneous generation among these must be abandoned by those who shall be sufficiently at pains to inform themselves on this head.

The following are a few of the different modes of propagating that have been observed to take place respecting them.

There is a small globular animal of the microscopic kind very common in pools of stagnant water (about London); it is called *Volvax globator*, and is thus described by Bonnet. "The whole of its interior is transparent, and permits us to see, by the aid of the microscope, little spherules within it; within these are other spheres, and in these last others still; and all these spherules are so many animalcules of the same species contained one within the other, which are developed successively, and in a short time attain the size of the mother who originally contained the whole. No less than five generations of this surprising animalcule have been discovered within it at one time,

and there is good reason to think that we should penetrate still farther into this abyfs of generations should we succeed in rendering our microscopes still more perfect than they yet are." The body of the mother opens to emit the spherules when they have attained a certain size, and quickly closes again. The young, thus separated, soon attain their full size, and become mothers in their turn. Muller says, he has counted thirty or forty of these spherules incasing others within one mother at the same time, and of different sizes.

Many of these animals of infusions multiply by a natural division, as in the naiad above described. Not only does this take place in regard to some of those that are long, and worm, or eel-shaped, but also with some that are round, or oblong. One of those of this round class has been observed to have the singular instinct of carefully avoiding justling with any others when it is in its perfect state; but, when one of these animals is in the travail of multiplication, and the division pretty far advanced, they are observed to precipitate themselves violently upon others, as if to accelerate the separation.

Mr. Saufsurre discovered an animaleule in an infusion of hempseed, which exhibited a very singular phenomenon during the process of multiplication. It is oblong, and very active, having a kind of crooked beak. When it is about to multiply, it fixes itself by sinking its beak into the mud at the bottom. Immediately after, it begins to turn itself by little and little in such a manner as that the centre of its movement remains fixed, and that the spherule does not change

place. This movement is performed with great regularity, but varies in its direction, sometimes turning from right to left, and then from left to right, &c. After this motion has been continued for a certain time, there begins to appear two little lines upon the surface of the spherule, which form the figure of a cross. The animalcule is now about to divide. It agitates itself now more violently, and soon separates itself into four; forming, in a few moments, as many complete animalcules, perfectly resembling that of which they formed a part, only smaller. These increase rapidly in size, soon divide again into four, and there is no end of these subdivisions.

Still different from this, or any of those hitherto noticed, is the mode of multiplication peculiar to a very small *animalcula infusoria* of the polypus tribe. This species has a roundish body, with a very slender tail. From the inferior parts of its body are detached at times small fragments of itself, which, as soon as separated, are in continual movement, and swim very fast. These fragments, considerably lengthened, are the principle of new animalcules. A few hours only are required before they assume a perfect resemblance to those from which they were detached.

Many other diversities take place in the mode of multiplying these microscopic existences; but it is unnecessary to pursue the subject farther in this place. It is enough barely to remark, that among these there are some which are viviparous, and others oviparous, as among the larger animals, although still without males; and, as we found that the pucerons are at times viviparous, and at other times oviparous, so among

these small animals there are some which at times multiply by division, and at other times by means of eggs; such among others is Mr. Saufsüre's beaked insect above mentioned. When it comes out of the egg, it is at first spherical; then it becomes oblong, and at length acquires its beak.

But, among all the animated beings on this globe, no one hath excited such a variety of interesting sensations among the observers of nature as the polypus: a creature which most of my readers must have heard of occasionally, but concerning which many of them cannot have had opportunities of forming distinct notions; on which account, and because it has brought to light several phenomena relating to the subject of our present disquisition, that bear no analogy to any thing else that had been formerly observed, I shall beg leave here to enter into some explanatory details respecting it, which I doubt not will prove acceptable.

Of the polypus tribe there are a great many varieties which differ from each other considerably in regard to their size, form, habits, and other particulars; but they all live in the water, most of them in ditches and stagnant pools in all parts of Europe. They are all also of a very diminutive size; many of them being merely microscopic objects, and most of them so minute, as scarcely to admit of being distinctly observed without the aid of glasses. On this account, it is probable, they escaped the notice of the ancients; for, although some hints have been discovered in ancient authors, which, since the nature of these animals has been fully known, would seem to allude to them; yet

these were so obscure, as not so much as to lead to a search after them. Lewenhoeck, about the beginning of this century, met with them in the course of his microscopical researches, and published some slight notices concerning them: but it was not until the year 1741 that the attention of Europe was strongly turned towards this subject, by the publication of Mr. Trembley's discoveries respecting it; which appeared to be so wonderful, and in many respects so contrary to the ideas that had been previously entertained respecting animated nature, that it gave rise to a variety of disquisitions which have tended to throw much light upon the subject of natural physics. In January 1741 Mr. Trembley, in a letter to Mr. Bonnet of Geneva, informs him, that an object had strongly engaged his attention of late; but he did not know whether he could call it a plant or an animal. "I have studied it," says he, "ever since June last, and have found in it striking characteristics of both plant and animal. It is a little aquatic being. At first sight, every one imagines it to be a plant: but, if it be a plant, it is sensitive and ambulant; if it be an animal, it may be propagated by slips or cuttings." This is the earliest notice we meet with of Mr. Trembley's discoveries respecting the polypus. In a few months after this letter was written, he was entirely satisfied that the little being belonged exclusively to the animal kingdom.

Soon after this, Mr. Trembley published, in a series of memoirs, the result of many experiments that he had made on the polypus, by which its animality was distinctly established, and at the same time the

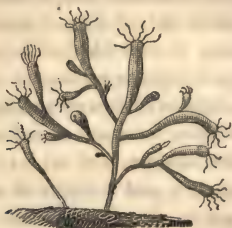
power of propagating it by cuttings after the manner of vegetables. It was even proved, that it retained the principle of life much more tenaciously than perhaps any kind of vegetable; insomuch that it might be accounted, in some measure, indestructible, if it was not removed out of its natural element the water. When its head was cut off, it seemed to suffer no injury: the body soon acquired a new head, and the head a body; so that it now became two perfect animals in place of one. If it was cut into three parts transversely, still each of them continued to live; and each of them soon perfected all the parts that were wanting, so as to become three complete animals. If it was cut into four, five, ten, twenty different parts, the case was not altered; each of these continued to live, and thus became distinct and complete individuals, possessing every faculty and power of the parent animal. Nor did the wonders rest here: if the body was slit downward from head to tail, and thus divided into two, or any greater number of parts, all of these also became in a short time so many complete animals as before. If it was thus divided longitudinally only for a short way, into two or more parts, each of these was soon converted into a head, and all belonging to the same body: so that the fable of the Lernian Hydra was thus realised; for the number of these heads might be multiplied at will. From this circumstance Linnæus has distinguished one division of this class of animals by the name Hydra. In short, let it be cut in any manner you please into atoms as small as you can make them, instead of destroying, you only multiply it the more; for each of

these atoms will soon become a perfect creature, complete in all its parts as it was before the division. Nor do the wonders that this little creature exhibit stop even here. In its natural shape it resembles a kind of pouch, or purse, so as to admit of being turned inside out; nor does it seem to sustain any injury from this very violent operation; but it goes on thus to feed, and perform all its other functions, as before. One may be even put within another, and yet both live; two may be grafted together, and a variety of other operations performed upon it, that it would be too tedious here to enumerate, without destroying, or essentially deranging its animal functions.

But, although this animal may by cutting be multiplied *ad infinitum*, yet it will be easily conceived, that this is not the way in which nature intended it should be propagated. In regard to this particular many diversities take place among the different species, some of the most striking of which I shall beg leave to illustrate by means of figures.

The *Hydra Grisea*, and *Hydra Stentoria*, *Lin.* (the *polype a bras* of Trembley) being so nearly the same, unless it be in the length of their arms, the following particulars will nearly apply to both. The hydra can assume any position, whether it be upright or pendent; yet in general it chooses to attach its tail to some body from which it can hang downwards; but as such bodies are not always to be met with, it then assumes an upright position, and when it is in full bearing, and in its most vigorous state of growth, it has a strong resemblance to a tree, or shrub, growing from the bottom. This animal, in its most simple state,

and before it has begun to breed, resembles a kind of hollow tube, narrower at one end, and widening



irregularly towards the other, as above. At this widest end is placed the mouth, which is surrounded by arms (more or less long in the different species) with which it seizes its prey, and conveys it into the mouth; from whence it descends into the stomach, which occupies the whole of the body; and which is susceptible of being contracted and dilated, so as to assume whatever shape shall correspond with that of the object it has swallowed; and it can besides be varied in its proportions at the pleasure of the animal. There is only one opening into this stomach, which is the mouth; so that the indigestible part of its food is thrown out, as well as taken in, at that orifice. The creature has the perfect command of its arms, which it can stretch out or contract at pleasure, or move about in any direction, as the horns of a snail nearly, though these are more flexible. When at any time its voracious appetite is satisfied, and it is disposed to be at rest, it usually draws in its arms, and closes its mouth, assuming then the form of an oblong

knob; but when it is in search of prey, its arms are stretched out, and moved about in all directions.

When the Hydra is about to breed, the embryo of the young makes its first appearance like a small excrescence on any part of the body (for all parts of it seem to be alike in this respect). This quickly shoots out into a greater length, like a young branch pushing out from the stem of a tree, the branch becoming gradually thicker towards the head, and smaller towards the tail, where it adheres to the mother; its arms soon appear, and it is then become a perfect animal, resembling, in all respects, the mother from which it sprung. It now catches food for itself, like other individuals of its kind, and may very well subsist by itself; and indeed it sometimes separates itself from the mother at this period of its growth, drops down towards the bottom, and moves about till it finds some convenient object to which it can fasten itself, and to which it fixes its tail, and then sends out shoots as its mother had done; but in general it adheres to the mother for some time longer, and becomes, while in this situation, a mother also; its young pushing out from its body, like branches from a tree, which, in their turn, carry other branches of young; thus ramifying to a considerable extent, altogether forming one whole. From the mode in which the young are here produced, some philosophers, in allusion to the terms *viviparous* and *oviparous* animals, have been disposed to call all those which multiply after this manner *ramiparous* creatures.

Sometimes a large branch, with all its young ra-

mifications adhering to it, is detached from the mother, at other times individual young detach themselves before they begin to breed; so that no regularity is observable in regard to this particular. But, however long they may adhere, and whatever number of them be clustered together, it is an undeniable fact, that so long as they are conjoined, the food that is sucked in by any of the mouths goes equally to the support of the whole, there being a free and open communication between every one part and all the others. This is very distinctly perceptible when a red worm, or any coloured body, is taken in as food; for the matter of which these creatures consists being very transparent, the progress of any of these coloured kinds of food can be easily traced through the whole.

Particulars respecting the propagation of other varieties of this singular class of animated beings are, for the present, deferred.

[To be continued.]



A Ram of the Spanish Breed.

MISCELLANEOUS LITERATURE.

On the propagation of Heat.

To the Editor of Recreations in Agriculture, &c.

ESTEEMED EDITOR,

IT was nothing but a dissatisfaction with some of the “principles developed in the essay on cooling-houses” in the fifth number of thy Magazine, that at first induced me to address thee on the subject. I have reconsidered the circumstances that made me dissatisfied, as advised, and I am dissatisfied still. As it is admitted on all hands, that philosophers sometimes err, and as I have not the arrogance to assume to myself infallibility, any more than those of Italy or elsewhere, I hope that any thing I shall advance, if erroneous, will be treated with that candour which thy publication has appeared to me so far to be famous for, and in the prosperity of which I find myself interested. I trust also, that the writer of that essay will ingenuously convince me of my errors by reason and experiment; for I am open to conviction, and wish to follow truth “with bosom bare.”

It has been found by various experiments, that heat, latent fire, or, as the moderns call it, caloric, is uni-

versally diffused; that there are no substances with which we are acquainted that contain not more or less of it (even those we denominate cold) which they have originally received from that parent of heat, the sun. All our sensations of heat and cold arise from the disposition of bodies that we come in contact with, or which surrounds us, to give out this heat to us, or take it from us. When I lay my hand upon a body colder than my hand, if it be a good conductor of heat, I immediately feel a sensation, like an effort of the two substances to restore an equilibrium of heat between themselves; that I call cold: on the contrary, if I am in contact with a body warmer than myself, that body imparts to me part of its caloric, and I feel the sensation of heat. Thus nature, in this as in other respects, is always endeavouring at an equilibrium. When I step into a room whose atmosphere is warmed by fire, or otherwise, it gives me of its heat; and when I ascend a high hill, I impart heat to it: in the former case I feel warm, and in the latter cold. Now most, if not all, substances in nature may have their dispositions for giving out or receiving heat altered materially by mechanical force. By forcibly rubbing dry wood together, it takes fire; by hammering iron on the anvil, it may be made even red hot: but there are few bodies more susceptible of this change than air, as is very obvious in the art of condensing it. Take a condensing syringe, and, after giving a few strokes, apply the hand to the sphere into which the air is condensed, and the sensation of heat is felt; continue the operation, and the heat increases as the air is more contracted; and thus it appears,

that a great part of the fire it contains may be pressed out of it, and given to the surrounding bodies in contact with it; but, if this air be set at liberty again, it will expand, occupy the same space it did before, and draw away from those bodies the very same quantity of heat as it lost in compression: this seems essential to its existence in that expanded state. Professor Pictet found, by putting a little water in the syringe, and so setting the air at liberty, that it took part of the water to the mouth of the cock, and there froze it into ice,* which was nothing more than might be expected from the air taking away the caloric that held the water in a fluid state.

Now the whole atmosphere which surroundeth us, and encompasseth this earth, is nothing else than a large assemblage of this air that we have compressed in a small quantity, which not only proves it to be a body possessed of fire as other bodies, which can be easily pressed out of it, but also that it is highly elastic, and can be made more and more dense, according to the compressive power. But air is also found to have weight like other bodies; of course one part of the atmosphere must press another. But this pressure cannot be equal: the upper part must have less than the parts near the earth; and the top, if we can assign it any, will have none; but that at the earth

* This was erroneously accounted for lately in a periodical publication in this country, by saying, that it was the friction of the air that evaporated part of the water, and so congealed the rest. A person took occasion to write to the Editor on the subject, who, in the next number, disingenuously corrected the error by a note, without taking any notice of such a communication.

the most of all, because it has the whole column above it. Hence it may be clearly inferred, that the atmosphere must have different densities, according as we ascend; and, that this density is exactly proportioned to the compressive force, was proved by Boyle and Mariotte. After knowing the weight of the whole by this means, mathematicians found a rule to calculate the whole height, and assign the proper density to any particular height, and also by the assistance of a barometer to compute the height of mountains.

If the atmosphere were acted upon by no other cause, it would thus form itself to rest, and so remain, which would render it unfit for the many important purposes for which it is designed; but the goodness of the Creator has wisely provided another means to enable it to perform its functions, and that is heat, which I shall be authorised in pronouncing the cause of all its motions and changes. That heat rarefies and expands air, has been variously proved; but this, it must be remembered, is to be considered in conjunction with its compression; for the same quantity of heat will dilate the same quantity of air more, if subject to less compression by the surrounding atmosphere: but then this will feel colder than the other less expanded; because the more it is expanded, the greater is its disposition to receive heat, as has been already proved.

If the air were not thin and transparent, little or no heat would pass through it to us from the sun; but, because of this quality, it was believed by Bouguer, and proved by Saussure, that very little, or none at all, in clear weather, was stopped by it in its pas-

sage to us; so that the heat which it receives, it receives reverberated from the earth; and it is nearest the earth that the greatest changes of heat and cold take place, particularly in clear weather, as was proved by the experiments of Pictet, and Dr. Wilson of Glasgow; and by those of James Sex, recorded in the *Philos. Transactions*, vol. 78. In a clear morning, on the rising of the sun, we begin to find his genial warmth, both from the rays immediately received, and those reflected from the earth. Were it not for the density of the atmosphere in the morning, those reflected would, to use the expression, be immediately swallowed up by it, and lost to our feelings; but as the sun advances, and it becomes more and more heated, it has the property of expanding to receive that heat; otherwise, the heat of a meridian sun, even in this country, would be intolerable; and on the other hand, if the compressing weight of the atmosphere above did not keep its expansion within limitation, it would be such as would prevent its sitting "brooding with genial warmth" on the surface of the earth, and under the tropical countries as intolerable as those of the Poles.

Again, after the removal of this orb to other climes, there to perform his kind offices, were the air to remain in that expanded state which it has acquired in the course of the day, the heat that it would require to keep it so, would render our sensation of cold insupportable; but no sooner is the sun gone down, than the air, losing its expanding power, begins to contract. Were this contraction sudden, our sense of heat would differ little from what we felt in the day;

but it endeavours to maintain the position it has acquired, and thereby takes away the heat of our bodies, of the earth, and of that of the vapour it holds in solution, and precipitates it in dew, and from all other surrounding bodies, which afford it in greater plenty in the evening, than when the night is further advanced, because they retain more which they have received from the sun; but as this heat is expended, the air contracts, and thus the equilibrium is kept up for the night, and rendered tolerable. How insensible must he be who, when inquiring into nature, discovers such wise provisions by its Creator, and feels not his heart overflowing with gratitude and praise to the Author of all our benefits!

These changes are greater in tropical countries, where they have a vertical sun, and almost always a clear sky; they are also more regular, for we find the range of the barometer there regular: but as the air expands according to the quantity of heat, we may expect the cold of the night to be, in some measure, proportioned to the heat of the day, especially where they are nearly of equal lengths, as within the tropics. From what has been said, therefore, it is evident, that all these changes in the atmosphere are caused by the heat, and the heat and cold depend upon its degree of density. This very familiarly accounts for the cold we experience on the tops of mountains, and in all elevated situations; and, by pursuing the subject further, all winds might be thus accounted for. This opinion is at least fully confirmed to me, until I find a better to put in its place, by perceiving it to agree with that of Dr. Darwin's, with which I became ac-

acquainted only since I began to write this paper. For the experiments at large, I refer to the *Philos. Transactions*, vol. lxxviii; but, as his opinion from those experiments is so much to the purpose, and the transactions are in so few hands, I shall extract it.

“Now,” says he, “the vast region of air which surrounds our globe is perpetually moving along its surface, climbing up the sides of the mountains, and descending into the valleys. As it passes along it must be perpetually varying the degree of heat, according to the elevation of the country it traverses; for, in rising to the summits of mountains, it becomes expanded, having so much of the pressure of the superincumbent atmosphere taken away, and when thus dilated, it attracts or absorbs the heat from the mountains in contiguity with it; and when it descends into the valleys, and is compressed into less compass, it again gives out the heat it has acquired to the bodies it comes in contact with. The same thing must happen to the higher regions of the atmosphere, which are regions of perpetual frost, as has lately been discovered by the aerial navigators. When large districts of air from the lower parts of the atmosphere are raised two or three miles high, they become so much expanded by the great diminution of the pressure over them, and thence become so cold, that hail or snow is produced by the precipitation of vapour; and, as there is in the high regions of the atmosphere nothing else for the expanded air to acquire heat from, after it has parted with its vapour, the same degree of cold continues till the air, on descending to the earth, acquires its former degree of condensation and warmth. The Andes,

almost under the line, rests its base on burning sands; about its middle height is a most temperate and pleasant climate, covering an extensive plain, on which the city of Quito is built; while its forehead is encircled with perpetual snow, perhaps coeval with the mountain. Yet, according to Don Ulloa, these three discordant climates seldom encroach much on each other's territories. The hot winds below, if they ascend, become cooled by their expansion; and hence they cannot affect the snow upon the summit; and the cold winds that sweep the summit, condense as they descend, and are of temperate warmth before they reach the fertile plains of Quito."

Now, it is very evident, that any quantity of air, not acted upon by the sun, cannot be thus subject to change; but will remain in that same state of equilibrium that the whole atmosphere would assume if there were no sun: for instance, in wells dug in the earth, in mines, and all subterraneous caverns; where it will also be denser, because of a superior column pressing upon it, and of course warmer. This perfectly agrees with the experience of all miners, &c. who, in descending into their mines, even in extreme cold weather, always find it so warm there, that they are obliged to put off their clothes to labour; indeed, the heat or cold at the surface seems little to affect them there; they always enjoy nearly the same temperature; but, if it undergo any variation, it is more caused by the variation of the weight of the atmosphere above, than by any change at the surface. The temperature of the earth at a considerable depth, is subject to little, if any variation; this we know by the

equal temperature of water in wells and springs, which is the cause of spring water not freezing so soon as that exposed on the surface.

From what has been said, this inference, I think, is just, that no air at the surface, because of its coldness (which is a proof of its lightness), can descend into a well containing a stratum of warmer air, compressed by a superior force, and therefore proportionally denser, which is the cause of its warmth. If this denser air could by any means be brought from the bottom of a well of great depth without being permitted to expand, and let loose in hot rooms, it could not fail of having a very cooling and refreshing effect. But, in order to cool rooms by condensed air, I shall propose a more simple, cheap, and effectual method, which is by mechanically condensing air into a reservoir for that very purpose. Perhaps this may cause a smile; but be it so. I know some persons who, at this very time, are making experiments on the subject, not indeed to cool rooms, but to produce a far greater effect, and who have procured a patent for it; and, from my knowledge of their abilities, I have no doubt of their succeeding: but before this method is adopted, it will be worth while to inquire whether air compressed be hurtful to respiration, which I believe it is not.

Some of the ideas this paper contains may, to many, be novel; but, however it be received in general, I expect to have justice done it by thee. Thou wilt soon perceive that the effect proposed in the essay that gave occasion to this, is little, or not at all, affected; the dif-

ference lies chiefly in the manner of accounting for that effect. I remain thy friend,

ARRA.

Remarks on the above.

I FEEL great pleasure in bringing forward these observations of a writer who gives very unequivocal indications that if he shall steadily pursue the path he hath begun to tread, he will rapidly advance in the line of physics, with pleasure to himself, and benefit to the public. When a man engages in a discussion with a spirit of candour, and states such objections as a real conviction on his part may suggest, and from a sincere desire to discover the truth, he will always appear as a respectable member of society, and will be respected even in his mistakes. But those who start objections only for the sake of occasioning embarrassment to the party whom they wish to degrade, or to give a high idea of their own acquirements, are nothing better than pests in society, however brilliant their talents may be.

If this writer shall continue his pursuits, he will soon have occasion to observe, that there are many laws of nature which, though they continue to operate steadily at all times, are influenced and modified by various circumstances, which sometimes seem to augment, sometimes to diminish, and sometimes to annihilate entirely for a while, their influence; and no small part of that beautiful economy of nature which cannot fail to strike every person who is sufficiently

informed to be able to perceive it, arises from the harmonising effects of these kinds of reciprocations.

But in explaining any of these laws for illustrating a given subject, it would be extremely improper to enter at large into a developement of *all* those particulars; as that could only tend to embarrass the reader. The essay that gave occasion to the foregoing observations was intended to illustrate a subject which depended upon one of the most general laws of nature, the gravitation of fluids, particularly of air; nor was it thought to be in the least degree necessary to take notice of many particulars that have a tendency to augment or diminish the *quantum* of that effect. It was enough that the illustration, as far as it went, was perfectly just; nor will the principle be found to be affected by any of the phenomena above stated, nor by many others that might have been urged with a still greater appearance of justice. A few observations will be sufficient to satisfy the ingenious writer, that the circumstances which have struck him as objections, do not, when rightly understood, affect the case in question, farther than as modifications only.

The fact he mentions, of heat being generated when air is condensed in the air-pump, and cold produced when it is rarefied, is well known; but this circumstance is only *apparently* connected with the density or weight of the atmosphere. The heat, in fact, is produced only in consequence of the transition from a state of comparative levity to that of greater weight, and does not depend on the absolute weight of the air. This can be easily proved by a very simple train of experiments. Let the air be condensed in the air-

pump till it acquire, we shall suppose, the weight of two atmospheres, heat will be thus produced. Let things remain in that state for a sufficient length of time, and it will be found that the air within the receiver and without it have come to be precisely of the same degree of heat; though in this case the air within is of double the density or weight of that without it. This being done, open the valve of the air-pump, and allow the air to rush suddenly out of it, a degree of cold will be produced; though it is obvious that in this case the air both without and within the receiver remain at last precisely of the same gravity. Let these acquire once more the same temperature, and then exhaust the receiver as much as you can; a degree of cold will thus be again produced; but, after a short while, it will be found that the very light air within is of the same heat with the common air on the outside the receiver. Again, open the valve and let in the air, a certain degree of heat will be produced, though the air in this case is of no greater density within than without the receiver.

From this plain statement of facts, it is very obvious, that the heat or the cold in either case does not depend upon the absolute density or levity of the air, but merely on the variation that hath taken place in regard to that particular. The influence that this circumstance could have on the heat of the atmosphere must therefore depend upon the variations of the weight of the atmosphere as indicated by the barometer, which, it is well known, are casual and trifling; of course, were there to be no variation in the weight of the atmosphere, the lightest atmosphere, were no

other circumstance to affect it, would be equally hot as the weightiest; and of course it would be equally warm in the higher regions as in the lower parts of our globe. This, it is well known, is not the case in fact, as hath been justly stated by our correspondent. The circumstances which occasion that invariable diminution of heat in higher regions, had no occasion to be explained in the essay on cooling-houses; nor would it be proper in this place to enlarge upon them. These were hinted at in the introduction (Natural-history, page 32), and still more particularly alluded to, *ibid.* page 40, to which the ingenious writer of the above paper is referred. These particulars will come to be explained in due time in the course of this work, when we shall have occasion more fully to develop the beauty of that economy at which our ingenious correspondent glances.

With regard to the heat in mines, there can be no doubt that in *some* cases it is very considerable; but there can be as little doubt that this, wherever it does occur, is either occasioned by some chemical combinations very often effected by the admission of air (after the same manner that phosphorus is inflamed merely by the admission of air), or, by their being in the vicinity of some volcanic influence; or, from other causes (with which we are as yet unacquainted) of a local nature, such as those which produce hot springs; as at Bristol, Bath, &c. which are often quite contiguous to cold springs. That kind of heat, however, is only experienced in rare cases. In general, the temperature of mines is, like that of spring water, colder

in our regions than the external air in summer, and hotter than it is in winter; but in warmer climates, colder than the external air during the day at all times. The reason why the temperature of the solid mass of our globe is less affected by variations of heat than the atmosphere are so generally known, as to require no illustration in this place. As to men at work feeling themselves hot in mines, it is neither more nor less than what must take place in every situation. Wherever there is only a small quantity of air, and no circulation of it, this must soon be experienced, whatever the natural cold of that air may be.

The brevity to which I wish here to confine myself, forbids me to dilate upon this subject; but, for the farther satisfaction of this correspondent, it may not be improper to bring to his recollection a fact that every body knows, which is, that whoever goes into a close cellar below ground in summer, will soon feel that he is in a cooler region than in any apartment in the same house above ground; and, were the cellar isolated from the earth (which might be done at a very small expense), there can be no doubt but it would be colder in winter as well as in summer; and the deeper, the cooler it would be in all cases, if the entry into that cellar communicates with the open air on a level with the ground.

That he may be able to perceive the effect of isolation from the earth in regard to this particular, I shall point out two ways by which he may have access to observe it. A flat gravestone, elevated on pedestals, is thus isolated; and he will soon have occasion to perceive that snow is longer in being melted on such

a stone, than that which has fallen on the ground all around it; unless it be that which lies above a covered passage, as above a drain through a field, &c. the course of which may be distinctly traced by the snow lying there after it has been melted on all the rest of the field. This last case also affords an instance of the facility with which such isolation may be effected. The effect of isolation was not overlooked at the time the essay was written, and would have been taken notice of then, had it been judged necessary: but, as the question was not how to obtain air cooled to the most intense degree possible, but merely to obtain air cooled to such a degree only as would excite an agreeable sensation in the human frame, it was not thought necessary to take notice of it.

I shall only mention here one other phenomenon which has been often remarked, and which affords the clearest practical demonstration that hath yet occurred to me of the justness of the principle developed in the essay on cooling-houses. It is universally admitted, that in a hilly country, the general heat in the valleys is much greater than on the surrounding hills; and that the ripening of corn is later in general in proportion to the degree of elevation of the place where it grows: we should therefore expect that plants which are impatient of cold, such as the potatoe, whose succulent leaves are affected by a very slight degree of frost, would be sooner blackened by it on the elevated grounds than in the vallies; but this is not the case. It frequently happens, that a slight frost takes place in the night-time during the months of August, September, or October, that is sufficient to

blacken the leaves of the potatoes which grow in the valley, while those on the sides of the eminences all around it are not in the smallest degree affected. This fact, so contrary to what was naturally to be expected by those who never adverted to the circumstances explained in the essay on cooling-houses, has been often remarked with astonishment; but the cause of the phenomenon has never till now been explained. To those who consider that the cold air, in its descent, must quickly slide down from the heights into the bottom, where it will be accumulated in quantities like a pool of water, and continue to act upon the plants that are immersed in it, until the influence of the morning sun shall dissipate it—to such persons, I say, this will no longer appear a mystery: nor will it be difficult to perceive the reason why summer blights and mildews are more frequent in vallies than in more elevated situations; which facts, and several other phenomena, will of course be explained when that subject shall come to claim our more particular attention.

Let not my ingenious correspondent, however, so far misunderstand me, as to suppose that I mean to deny the influence of the principle he has adopted. I only mean to set him right as to the *quantum* of that influence, which he has so greatly over-rated. I have already admitted, that wherever a particle of air is expanded, by removing the pressure from it, a certain degree of cold is produced, and *vice versa*; nor do I feel any inclination to dispute, for the present, that the same thing may happen wherever a particle of air is expanded by the operation of heat; though I confess that I know of no decisive experiment which tends

to prove that this really does happen. But admitting for the present that this were undeniably certain, then in that case there could be no doubt but the *quantum* of heat communicated to that particle of air would be less than it would have been if no expansion had taken place; but still if the heat had not prevailed above the cold produced, the effect would have been null, or only vibratory, like the motion of the valve of one of Noot's machines for impregnating air; and of course nothing but a momentary expansion of air could ever have taken place. To say that this is not the case in fact, would be only asserting a truth which is known to all the world. Is there a child who does not know that if a flaccid bladder be firmly tied up, and held before the fire, it will be quickly distended in consequence of the expansion of the heated air within it? And as to the *heat* of that contained air, the mere expansion of it alone is demonstrative evidence. Dip it in cold water, and it will soon be as flaccid as at first.

I could have wished, on my correspondent's account, that the last paragraph but one of his letter had been entirely omitted; for I either understand it not at all, or it contains positions that are contradictory alike of the writers's own hypothesis, and of some of the most incontrovertible laws of physics. Does he really mean to say, that a particle of air, when heated by the sun, or otherwise, at the surface of the earth, will be prevented from expanding and rising upwards because of the great pressure of the superincumbent atmosphere? This would be a position that is contradicted by the most incontestible facts. It is well known, that the denser the air is, the more rapid would be the ascent

of such a particle. A balloon is, in fact, a particle of lighter air in a denser medium; and, agreeable to the laws of statics, its velocity is proportionate to the difference between the gravity of the surrounding medium and its own: so that it is always greatest in the lower regions; and, decreasing in velocity as it ascends, it becomes entirely stationary when it reaches a height where the atmosphere is of the same gravity with itself. A Mongolfier balloon is, in fact, only a globe of heated air, which obeys the same laws with the lighter gases. What is smoke, but heated air, ascending and carrying with it the denser vapours which are emitted from the fuel in burning, which gradually fall to the ground as the air which conveyed them loses its heat?

That cold air, in every situation, unless where it is interrupted in its descent by the more powerful ascent of warm vapour in a confined place, invariably assumes the lowest place (wherever it is not so quickly heated by the reverberation of the sun's rays, or the influence of a heating body below, as to prevent it from resting there), is an undeniable fact, confirmed by the experience of every hour of our lives. Let an apartment be warmed by means of candles burning in it, or a number of persons assembled together; does not every one know that the air, in the higher part of the room, is invariably hotter than that which is next the floor? Who is not acquainted with the well-known experiment of lighting two candles in a room where a good fire is burning, and holding these two candles in the doorway, one of them close by the floor, and the other at the top of the aperture? And is there any one who

does not know that the flame of the uppermost candle will be blown outward by the emission of the heated air there, and that of the lower candle drawn inwards by the current of cold air below rushing in to supply the waste? Who, in short, that has had the smallest experience in life has not had occasion to feel that, during a keen frost, when he has been sitting before a good fire with his back towards the door, the hinder part of his ancles and feet have been chilled to an intense degree, in consequence of the dense cold air flowing along the floor towards the fire acting so powerfully upon them; while the back part of his head, though uncovered, suffered not a sensation of cold in any degree approaching to that? But I beg pardon of my readers for incroaching on their patience by putting them in mind of things so generally known.

I willingly omit to take notice of several other passages in this paragraph which have the appearance of having been written purposely in an enigmatical manner; a mode of writing which, on serious subjects, I cannot much commend.

Let not these remarks prove, in any way, discouraging to my young correspondent. Nobody has had more frequent occasion than I have had, to remark the aberrations of genius. Nothing is more natural than for vigorous minds, which are keen in the developement of a favourite idea, to overlook collateral circumstances, which they will, themselves, perceive when they have time to reflect coolly upon it, and which would have been observed from the beginning by those of weaker powers. No person will pretend to deny that Dr. Darwin possesses great vigour of

mind, a comprehensive understanding, and brilliant talents; but neither will any one who is able to appreciate his works refuse to admit, that he is often hurried away by these powerful energies to overlook circumstances that are of great importance to the discussions in which he engages; and to draw bold, though hasty conclusions, which facts, that a more cautious inquirer might have had opportunities of knowing, would by no means authorise. Other men possessing similar powers will be ever liable to fall into inadvertences of the same kind.

I hope the writer will find that his paper is printed with due attention to the meaning, though, in a very few places, I have ventured to correct what I conceived to have been mere inaccuracies; as in page 121, line 14, for "*contracted*," as it was written, "*dilated*," the sense evidently requiring it. Again, page 123, line 5, in the MS. it stood, "because of its *density, which is coldness*," the words in italics were omitted, merely to avoid a seeming contradiction.

It is hoped, that my ingenious correspondent will take in good part these cursory hints, which have been dictated by the same spirit that induced him to offer his observations—a candid and sincere desire to develop the truth, to promote the interest, to augment the happiness, and to extend the sphere of the enjoyments of his correspondent. His farther correspondence will prove very acceptable.

J. A.

To the Editor of *Recreations in Agriculture, &c.*

SIR,

IT was not till within these few days that I saw your very entertaining and instructive volume. Reading forms much of my amusement, and I have not passed through life without making some remarks on my road; which many involved in dissipation are too apt to do, and thereby render themselves less sagacious than a dog which I once knew, that had been given to a gentleman by its owner, and conveyed to the distance of about one hundred miles. It was at first tied up for a few days to make it acquainted with its master and family; but, dissatisfied with its new situation, it one night broke from its confinement, and on the second day arrived at its first residence, where, on account of its attachment, it finished its days. But I am deviating from my first intention, which was only to thank you for some hints and instruction that I have received, and to add my mite to your next volume.

You gave an account of a gooseberry caterpillar that had done much damage. The name had nearly led me astray, supposing that you had meant the larva of the *phalæna grossulariata*; until you came to describe it as beginning at the bottom of the trees; I then recollected being about fourteen years ago very much troubled with them on the currant as well as the gooseberry; and the very method which you direct for destroying them was the one I took. Being not

satisfied, however, with its appearance in that state only, I took some of the caterpillars, and fed them on currant leaves in a small box covered with a piece of gauze, wherein there was some earth, which at their natural period for a change of state they went into, and after a few weeks came forth flies about the size of the *musca domestica*, or common house fly; with this difference, that it had its abdomen yellow, and possessed four wings, being of the *genus* called *ten-thredo*. Upon further examining the nature of this insect, I observed that there were two breeds of it in the year; the *larvæ* of the first breed devour the spring leaf, and the second are ready to consume the summer shoot. Where they deposit their eggs I could not discern, but, as I conjecture, round the stem of the tree. Perhaps, therefore, it might not be an useless operation if the brush and soap-suds were applied in the spring before the leaf appears; for it is very observable, that insects seem universally possessed of an instinct to direct them to deposit their eggs on the very spot where their progeny are in future to subsist.

This seems to be particularly evident with respect to the *larva* of the *tinea*, which infest and destroy our roses. The same warmth of the atmosphere that pushes forward the vegetable bud hatches the eggs that are deposited close adjoining, and thereby affords it a tender morsel as soon as it shall have burst its shell. That the egg must be fixed at that place appears clear from this; that if you cut a rose tree below the buds of that year's shoot, and thereby oblige the tree to throw out its fresh wood for blossom from the old

stem, your roses will be all perfect, and have no insect to destroy them. This observation I have frequently made. But let me now return to my gooseberry tree.

Alas! this caterpillar is not its only enemy. I have been plagued every spring, some years more than others, with something that destroyed the gooseberry while in blossom; the gooseberry is never touched, but the blossom only as soon as it is expanded; some taken away in part, others altogether: thus the fruit is injured before the blossom has rendered it perfect, and in consequence the berry withers and dies. To investigate this mischief, I daily examined whether any insects were near that I could have reason to suspect. At midnight I visited the trees (for some insects feed by night), spread paper under them, and shook them, in hopes of detecting the culprit, but all in vain; and I had nearly given over my pursuit in despair of succeeding, when one day last spring, conversing with a gardener on various experiments, he was complaining of the short crop of gooseberries that he was likely to have. I condoled with him on the occasion, being in the same situation; and told him, that though I had used every method that had occurred to me, I could not discover the cause. "Oh," said he, "the cause I know, but my knowledge came too late; it is done by the sparrows; I caught them at it."

This brought on a train of reflections, which united in confirming the truth of the assertion. I have many sparrows about my present garden, as I also had where I resided about twelve years ago; when in spring I could never preserve a crocus for them, as they would

destroy a whole row presently. Their method was to bite them off just where the petals unite, or a little lower, and scatter them about. I conjecture that they found something sweet from the *stile*, or *antheræ*, that pleased them, as they do in the gooseberries. I observe that in backward springs they are most prejudicial; for, being kept long from any tender vegetable fruit or insect which they are fond of, they fall greedily on the first that appear; among which are known to be the crocus and gooseberry. The only method of preservation in extensive plantations must be by a boy to drive them away, which I am told one gardener hath adopted, and found it succeed: in small gardens they may be covered with a few nets.

VERAX.

Thanks to *Verax* for this useful communication. The losses which men sustain from their not adverting to the circumstances which occasion their distress are very great. By a little well-timed attention much of that might be prevented. I cannot, therefore, too often, nor too strongly, recommend an attention of this sort to all my readers. The above communication exhibits a convincing proof of the pleasure, as well as the benefit, they might derive from such exercises.

Whether the sparrows do more mischief by picking off the flowers of the gooseberries (and cherries, for I have observed they pluck these off also in the same manner), or good by picking up the larvæ of various insects, is a question which I shall not pretend to

solve; though the probability seems, that the decision would be against them, when the ravages they commit among ripe fruit and pease are taken into the account. But, if the conjecture of my correspondent be well founded, which seems to be very probable, that they are induced to pluck off the early flowers only because they are stinted of food at that time, it might perhaps be possible to save these last, merely by furnishing the birds at that season with a little nourishing food well adapted to their palate, leaving them to search out larvæ for themselves at an after season. But I fear it will be a difficult matter to discover any thing that would allure them from the delicious fruit.

As to pease, perhaps a more palatable substitute for these may be discovered; for it is very remarkable, that it is only at particular times they attack that crop; which renders it probable that they are then deprived of a more pleasing food, which prevents them from looking after the pease at another season. It is well known that caterpillars abound chiefly in the beginning of the season, and become more scarce as the season advances. Many of these hide themselves in the earth, and other coverings, during their inactive chrysalis state, at which time they are beyond the reach of birds. At this season, then, it is not improbable that the birds who prey upon insects may be much pinched for food, from which they will be relieved, in some measure, when the insects come forth in their winged state. It would be worth while to try if any connexion could be traced between this circumstance, and the casual voracity of sparrows for pease. If so, a little delicate food provided for them

at that time might save the pease, and enable them to continue their useful kind of hunting at other seasons.

Extracts from a manuscript Account of the Loss of the Winterton East Indiaman upon the coast of Madagascar in August 1792, written by one of the passengers who survived; and transmitted to the Editor by Dr. Anderson of Madras.

[Instead of giving the complete narrative, which is now no longer a matter of general curiosity, it has been judged most expedient to select a few passages respecting the nature of the country and its inhabitants, which, it is presumed, will prove acceptable to our readers; more especially the private character of the king, which, though not devoid of human frailties, exhibits a natural picture of genuine philanthropy and native dignity of moral sentiment that has been seldom exceeded, and which it would be an act of injustice to suffer to be buried in oblivion.]

INTRODUCTION.

NOTHING can convey so perfect an idea of the utility of those restraints which a well established government imposes upon man, than to transport some of those who have been accustomed to the influences of such a government to a country where the natives are unacquainted with such restraints. This was the case with the few unfortunate sufferers who

escaped from the wreck of the Winterton East Indiaman, who, after experiencing a series of the most distressing fatigues and dangers on the sea, at length reached the shore on the island of Madagascar, near the bay of St. Augustine, on the western coast of the island; for, although they found the natives, in general, by no means prone to acts of wanton cruelty, yet each individual there had been so much accustomed to act upon every emergency as accorded with the dictates of his own mind, that there could be no security afforded strangers either for person or property for one moment, under any system of conduct that could be adopted. If one person whom these unfortunate strangers met with was disposed to treat them with benevolence and kindness, perhaps the next they saw, regardless of their supplications and tears, or the intreaties of the persons who wished to befriend them, stripped them of every article they had about them that seemed desirable to him, even to the very provisions which they perhaps had begged for their support, leaving them with unconcern to their fate. In such a state of anarchy no germ of industry could ever be expected to spring up among the people. The soil, though naturally fertile, remained uncultivated; the spontaneous fruits of the earth were often destroyed before they had attained their proper degree of maturity; and the inhabitants, of course, liable to experience the distresses of famine, were not at liberty to exercise those acts of beneficence which can so easily be performed among civilized nations, who have always abundance, and to spare, without being obliged to suffer, themselves, any distressing inconvenience

from it. Nor were the natives themselves, in many cases, in all probability, aware of the very severe hardships to which they subjected the strangers by depriving them of such things as, though desirable to them, they could themselves have parted with without suffering any great inconvenience. To a person who has been accustomed to go about nearly naked, the want of clothes must appear a much less serious evil than it really is to those who have never been without them from their infancy: how easy does it seem for a person who has always been accustomed to have his feet naked, to walk any distance without shoes! Nor can he believe it possible that a human being could suffer such exquisite distress from being stripped of that article of dress, as those who have never walked without shoes must necessarily feel on being left barefooted in the midst of their journey. From circumstances of this nature, our unfortunate sufferers (among whom there were some ladies of a genteel rank in life, who bore up with wonderful spirits under an accumulation of distressing circumstances) were doomed to experience a series of most painful events, without being able justly to accuse the natives of absolute cruelty, in a journey of more than an hundred and twenty miles, that they were induced to undertake at the invitation of the benevolent prince who then filled the throne in that district, to the place of his residence; for it was there alone that he knew he could afford them that protection and support which his generous disposition induced him to bestow.

Among these people, though the powers of government be too much circumscribed, and the laws too

imperfect to afford a steady protection to any individual, yet there are certain established customs among them to which all are expected to adhere. Among these is the institution of a king, to whose authority, when he takes personal cognisance of affairs, they submit with the most implicit obedience; yet they have not advanced so far in the science of government, as to have formed an idea of delegates from the king, acting under his authority at a distance from him, for the purpose of administering justice, according to the tenor of permanent laws promulgated for that purpose.

Passing over the particular narrative of the shipwreck, and adventures of the persons who were saved, as events that have been long known to the public, I shall present my readers with a few extracts from the performance, tending to give some idea of the nature of the island and its inhabitants in the words of the writer.

EXTRACTS.

“THE island of Madagascar is divided into nearly thirty independent kingdoms, which are more or less civilized according to their situation, or according as their intercourse with other nations is more or less considerable. It was exceedingly fortunate for us, that we were not wrecked farther to the northward of where we were, as the inhabitants there nearly border on a savage state. The country in general is said to be very fertile. The French had several times attempted to form a regular settlement on the east coast, but have always failed. The zeal of fanatical priests to pro-

pagate their religion, or the indiscretion of their governors, have always excited the jealousy of the natives. They still, however, continue to carry on with this island a very considerable trade from the Mauritius, the principal imports from which place are slaves, bullocks, and rice. Some Frenchmen have been known to take up their abode among the blacks of that quarter, and have become perfectly acquainted with their language and customs. But of all this we were totally ignorant when we landed; and it was a long time before any of us knew that there was the smallest intercourse between Madagascar and the Mauritius. The king indeed knew it; but he had an idea that the most inveterate enmity subsisted between the English and the French, and therefore did not mention it till about two months after our arrival. We immediately conceived the idea of sending some of our people across the island; and the king consented to order guards along with them, but said, that it was necessary first of all to consult his chiefs, which he did. The result was, that they thought the expedition dangerous, from the probability that the rivers would be swelled by the rains, which, by that time, were probably begun up the country; so that our plan was rendered nugatory. During our stay we laboured under such disadvantages, from bad health, and from not being acquainted with the language, that our information was extremely limited. Beside, as none of us ever went many miles from our fixed place of residence, our remarks could extend no farther than the neighbourhood of St. Augustine's Bay. But what few observations occurred shall be here inserted.

GOVERNMENT.

“ The king is, in every respect, absolute. He disposes of the lives of his subjects at pleasure, and they are proud of the privilege of calling him master. During our stay in his dominions we had several instances of his arbitrary power, and of the promptness with which his will is executed; which, added to the almost universal enmity that was excited against us, and the king’s being extremely addicted to drinking, rendered our situation truly perilous. One day, in particular, we were alarmed with the most dreadful noise. Upon inquiry, we found that they were executing vengeance upon one of the physicians, who was said to have caused the death of a relation of the king by some improper medicine which he had given him. As soon as sentence was pronounced, the man tried to make his escape, but had not ran far before he was pursued by a whole troop. They overtook him at a distance of about half a mile from our huts, and soon dispatched him with many stabs. The body was not allowed to be interred, but was left on the spot to be devoured by dogs.

“ Beside the fishermen, there are only two distinct classes in the state, viz. that of the king’s soldiers, and that of the slaves. Excepting those in the first class, all who are freemen and able to bear arms, are soldiers, and seem to be always ready for war at a moment’s warning; which, with other circumstances, made us suspect that sudden incursions are not very uncommon; and in fact we were frequently under great apprehensions of them.”

“ The kingdom is divided into a number of small governments, the chiefs of which acknowledge the superior control of the king, and come from time to time to pay him homage. In general, when the king gives any of them audience, he is seated on the ground with several of his soldiers round him; when he, to whom the audience is given, approaching him, kneels upon one knee, and, covering his head with his hands, bows it almost to the ground. Nearly the same ceremony is observed on receiving the ambassadors of any of the foreign powers. We were present at a deputation sent by a neighbouring prince, in consequence of some misunderstanding between him and our protector. The ceremony was as follows: the king, attended by about eighty of his people, went out, and seated himself upon a sandy plain, where, after having waited about half an hour, the ambassadors, who had kindled their fire at the distance of about a quarter of a mile,* came up with their attendants, who drove four or five bullocks before them as a present for the king. Being seated at about five paces from him, they broached the subject of their mission. Several replies were made; but the purport of all the discourses, as we were told, was a promise of future friendship on the part of their master. The matter being adjusted, they presented the king with some small beads, in a straw basket, as a token of amity, and then departed.

* When the natives move from one place to another, instead of huts they in general content themselves with enclosing a small piece of ground with bushes, and there kindling their fires.

“The king has secretaries, who, at the same time that they act as his counsellors, seem to be charged with whatever he has of most value. No war is ever entered upon, nor any other step of importance taken, without having first undergone the maturest deliberation in a full council, composed of the principal men of the place; and it is surprising to hear the eloquence and apparent freedom with which they deliver their speeches. When war is declared, the king assembles his soldiers from all quarters, and they go out to meet the enemy. They do not, however, draw up in a regular line of battle, but make their assault from behind the bushes, which they do with such astonishing agility, that a man may be sometimes attacked before, and sometimes behind, without his ever perceiving his enemy.”

[To be continued.]

Cursory hints on the means of obtaining green-houses, hot-houses, &c. without expence.

MANY accommodations, which would prove agreeable to man, are lost in every country on the globe, merely from that kind of inadvertency which so generally prevails with regard to circumstances, which, though evidently within our power, have not been applied by our fathers, in the particular district we inhabit, to the purposes that might render them beneficial in the way we want. I shall develope, in the present number, one instance of this kind. In some

of our future recreations various particulars of a similar tendency will fall to be noticed.

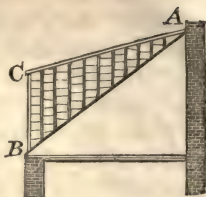
There are few persons, whether in town or country, who would not be well pleased to have a green-house, in which a few plants that are impatient of cold might be preserved through the winter, or some grapes ripened in the summer, were it not for the expence that a house of this kind would oblige them to incur; I shall therefore, I hope, perform an acceptable service to all such, if I can show that in almost every situation, any person who is about to build a house, may have it so constructed as that he may, if he pleases, have this convenience without subjecting him, perhaps, to one single shilling of additional expence; nay more, that he may, if he so chooses, have that green-house converted into a hot-house, in which pine apples, or other tender exotics, may be reared in as great perfection as in any other stove, without requiring, in the whole course of the year, the expenditure of a single ounce of fuel that he would not have used in his family, had no such article of luxury been ever thought of by him.

To perceive in what manner the first mentioned object may be attained, it is only necessary to observe, that every house must, of necessity, be covered in with a roof; and that this roof may be made of glass, at as cheap a rate as one of slate, or other materials equally durable that are now in common use; especially when the saving of the quantity of wood in the roof is taken into consideration, and also the relief that is given to the walls on account of the greater lightness of the

glafs. As I have already had occasion to show, [Vol. I. page 158,] that a moveable sash in the roof is rather an inconvenience than an advantage in such a case, the whole apparatus that would be required for that purpose may be spared, and of course the expence of a glafs roof by that means be greatly diminished. Instead of a garret room, you might thus obtain, on the south side of the house, a very convenient green-house, in which plants of a moderate height might be reared to as great perfection as in any other. And as it is known that the vine thrives perhaps as well where its roots are allowed to spread under the street as elsewhere, and may be trained, in the course of a few years, to the height of any house, it could be easily then introduced within it, and there managed in the same manner as in any other house, so as to be equally productive in this garret green-house as in any other situation.

As it is by no means necessary that a glafs roof should have so great a slope as a slate roof requires; and, as it is more convenient that the roof of a house for a vinery (where the full advantage of the heat of the sun is intended to be taken) should be pretty flat rather than steep; it will be in all cases of this sort a considerable advantage to put perpendicular windows on the top of the front wall, so as to rear the lower eaves of the glafs roof considerably higher than that of the slates would have been, even without raising the middle of the roof; therefore this should be done, as is represented in the figure, in which is given a section of the house seen endways,

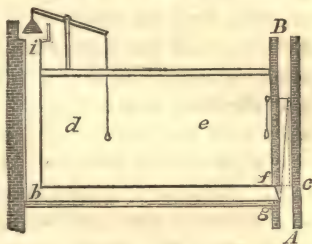
A B being the slope of the slate roof, A C the slope of the glass roof, C B the perpendicular front glass, and B C A the perpendicular glass where it rises above the slate roof; and, as the lower edges of this glass roof at each end, where the adjoining roofs



are not so constructed, will be higher than these roofs, it will be very obvious that this triangular perpendicular wall should be all filled with glass, through which the morning and the evening sun will be admitted into the house, when it would otherwise have been excluded from it. In the country, or in houses that are not connected with others, every where, it will be advisable to have perpendicular windows brought quite close down to the floor, both on the east and the west ends, to admit the sun in the morning and evening as long as possible; for, in all houses in which plants are to be reared, *light* is of the most indispensable utility for preserving them in full health. Heat may be obtained by other means; but it is the rays of the sun alone that can afford the necessary light, so that care should be taken to admit them as liberally as possible. From this consideration a plant-house, thus considerably elevated, will always be much preferable to those in a lower situation, because they will have less chance of being screened by the shade of higher objects from the influence of the solar rays both in the evening and morning, when that luminary is near the horizon.

These few hints are sufficient to show in what manner a place may be obtained in every house, without any expence, in which plants that require no artificial heat may be reared or preserved in this climate. It now remains that I should show in what way a house so constructed may, at pleasure, be converted into a stove for tropical plants that can be heated at all times to any degree that shall be required, without occasioning the expenditure of any fuel throughout the course of a year; on the supposition only that the house is to be inhabited, and provisions for the family regularly cooked in it during all that time.

To show how this may be done, let us suppose that *A B* represents the pipe of the kitchen chimney, through which the smoke is conveyed to the top of the house. Let *d e* represent a section of the greenhouse. Let an opening be made through the wall into the pipe of the chimney, as between *f* and *g*, so as to open the communication between the chimney and a flue passing through the intended stove *f h i*. At *f* is placed a valve turning upon a pivot *f*. When that valve is in the position *f g*, the pipe of the chimney is open, and the smoke ascends freely from *A* to *B*, and it is then excluded from the flue. On the contrary, when the valve assumes the position *f c*, the passage up the chimney is stopped, and the mouth of the flue is opened, so that



the smoke is forced along through the flue *f h i*. In this way the flue becomes heated to a certain degree. But, as the smoke is hurried through the chimney in a rapid manner along with a current of air only moderately heated, (the heated air rapidly hurrying past, without having time to communicate its full influence to the adjoining bodies, till it disperses itself in the open atmosphere, where it expends itself in vain;) it thus happens that a prodigious waste of heat, which was produced by the burning of the fuel, is thus incurred without producing any useful effect. To obviate this waste, let the top of the tube at *i* be formed by a round tile, wider at the top than the bottom, for the purpose of admitting it to be closed by merely dropping down the solid tile *a* till it meet the shoulder below it; (the bottom of the cover being lined with some pieces of thick cloth to allow it to apply quite close all round, so as to make it air-tight.) When this cover then is dropped down, merely by letting the wire *d* go free, no more heat can escape by that passage. The heated air, however, will continue to rise and assume its place; that which is the most heated being always the highest, while that which is heated to an inferior degree will be forced downwards to *h*, then to *f*, and then lower down the chimney, till it reaches the fire place, all the upper parts of the tube becoming still hotter and hotter during each instant while this process is going forward. When the whole of the aperture, however, becomes so full, as to regorge the smoke upon the kitchen fire, and thus to produce a kind of stifling closeness, it will be necessary

to drop the valve *f* till it assumes the position *f g*, thus opening a free passage along the whole of the chimney from A to B, through which the smoke will now be allowed to pass with freedom. In this way the flue, now filled with heated air, being closed at both ends, can become cool once more, in no other way than by transmitting its heat through the sides of the flue into the house through which it passes, so that the temperature of that house will thus be raised by it gradually, and continued for a length of time, so as to be augmented, in a degree, proportionate to circumstances that now require to be stated.

To give the reader a clear idea of the manner in which these effects are produced, I have chosen to represent the flue in the diagram under the simplest form it can be made to assume; and those who have seen the flues usually formed in hot-houses, will naturally apprehend that this ought to be made after the same fashion; that is, like a chimney of brick work, only assuming occasionally a horizontal position; and that it should be turned several times backward and forward for the purpose of lengthening the tube. In the manner such flues have been usually heated, by means of a continued succession of warm air passing through them, proceeding from a fire continued burning below without intermission, the tube cannot be too much lengthened; for make it as long as you will, a considerable quantity of heat must be allowed at last to waste itself in the open air: but this is not in the least necessary according to the plan I have recommended above. The best thing that can be done in this case, will be to make one or more boxes of mill-

ed iron, closely joined in all places with solder. The form may be such as best accommodates for the purposes to be made of the house; but in general it will be best to have several chests adapted to the position in which they are respectively to be placed, all of them communicating with each other by means of pipes of a sufficient size, so disposed as to incommode the house the least; and all of them placed as low in the house as circumstances will admit. I need scarcely remark, that the larger these boxes are, the greater quantity of heated air they will contain, and of course the longer time they will take to cool; in other words, the longer they will keep the house warm: so that, if the cavities within them be of a sufficient size, they may be easily kept warm, without any fresh introduction of heated air during the whole of the night. In this way the heat that must necessarily pass off by means of one kitchen fire, would be enough to warm not one stove only, but perhaps a dozen equally well as one; for after the flues of one of the stoves were thus heated, the valves of another flue being opened would revive the fire by the draught it would occasion through it while these valves were allowed to continue open; and when that was sufficiently done, the upper cover of the flue needs only be dropped, and time allowed for the whole cavities of that stove to be filled as before described; when the lower valve must be dropped also. If another flue be now opened, the draught of the fire will now be again revived, and so on you may go, filling one flue after the other with heated air, till the first filled begun to cool; when it would come in its turn to have its heat renewed; and so on

round the whole in continued succession if it be wanted. But when it is not wanted, the smoke may be allowed to get off directly, without affecting the house, through the top of the chimney B.

In this way the effect produced by the consumption of the same quantity of fuel, when compared with that which is produced when it is conveyed through flues constructed in the way that has been hitherto in use, would be immense (supposing the kitchen were out of the question, and that nothing was to be considered but merely the heating of the house); for you will please to recollect, that instead of being stopped in the flue till the warm air within it gradually parts with its heat to the cooler air in the house, it rushes rapidly forwards till it reaches the open atmosphere, where it is dispersed and lost. The fire must therefore still be continued to supply this rapid succession of dissipated heat; for you will be pleased particularly to remark, that the moment the fire is suffered to die out, no more heat can be communicated from below; but instead of that, a stream of cold air is, from that moment, forced up the chimney to supply the place of that which is heated by the bricks as it passes along, and thus escapes upwards. In this way the whole chimney is, as it were, washed with a continued stream of cold air; and the heat that was in it, and which without this washing would have continued many hours, is carried off in the most rapid manner that could be devised; so that the flue, from this moment, abstracts heat from the house, instead of communicating heat to it. Nothing can surely be more uneconomical than this extravagant waste of fuel; nor could any thing more effectually tend to frustrate the purpose aimed at than

this mode of procedure; because nothing can be more prejudicial to plants than those alternations of heat and cold to which they are thus inevitably subjected. All *stoves*, therefore, in every situation, ought certainly to be constructed on the principle I have above developed.

To give some idea of the quantity of heat that is lost in a tube where a continued stream of heated air is permitted to flow through it, when compared to one in which it is confined at rest, a very simple illustration will prove satisfactory. Every person knows, that if a bottle be filled with water boiling hot, and closely corked, and then wrapped up among straw, it will continue for a great many hours without any sensible diminution of its heat. But if, instead of a bottle, we were to take such a large body as a hogshead, it would continue without a very considerable abatement of its heat for four and twenty hours together. Say then, that for the space of twelve hours it was not very sensibly colder than a pipe of the same diameter with the hogshead, through which boiling water had been running for the same space of time, at the rate of twenty yards per minute. Suppose again, for the sake of calculation, that the hogshead was a cylinder of one yard in diameter, and precisely one yard in length, in that case there would pass through the tube in the space of twelve hours no less than 14,400 hogsheads of boiling water; and all this would be expended for the purpose of producing an effect that might have been attained by *one* hogshead only, closely bunged up. What an extravagant waste! you exclaim, and justly too; yet such nearly is in fact the waste that is incurred in the common way of applying fuel for the purpose of heat-

ing hot-houses, when compared to what it might be, under a judicious management.

I stop here, however, for the purpose of obviating an objection which I foresee may be urged against the illustration above given. It will be said, that the heat of the single hogshead of water would be somewhat diminished during the course of twelve hours: this is readily admitted; but then it must be admitted also, that at the end of twenty-four hours it would still be very sensibly hot; whereas, in the current of boiling water, the moment the current ceases to run, the pipe becomes empty, and it is instantly cooled; so that from that moment no more heat can be transmitted by that current. Now, although the heat of the single hogshead was somewhat less at the latter end of the twelve hours than that of the current, yet it is so much greater than that during the ensuing period of time, that I think there is no room for doubting that as much heat is communicated to the contiguous air by it upon the whole, as will be communicated by the current in the same length of time. The extraordinary waste then that is incurred by the current, when compared with the stagnant water, stands clearly and demonstrably established: nor can it fail to suggest a train of the most interesting reflections to every considerate mind. But our limits forbid us to enlarge upon them for the present.

One particular I may be permitted here barely to suggest, leaving the farther developement of it to a future occasion. It is this:—We have just seen that the garret-room of any house may be heated at pleasure to any degree that shall be judged proper for the health of any class of plants that grow on our globe,

by a contrivance that is in itself as simple as can easily be conceived, and without the smallest expenditure of fuel. Is it not then as obvious as the light of the sun in the firmament, that any other apartment in any house, that is more elevated than the kitchen, may, by a similar contrivance, be heated to any degree that shall be deemed most salutary to man in a cold climate, without being at the smallest expence of fuel for that purpose? Nothing surely can be more obvious. Is it necessary I should enter into particulars to specify more minutely in what way this could be easiest done, so as to admit of being regulated at all times by the will of the occupier of that chamber? To thinking persons nothing can be more superfluous. But if it should be deemed necessary, for the sake of others, we shall perhaps recur to it on some future occasion.

To Correspondents.

A MUCH respected correspondent has favoured the Editor with some hints dictated by the most beneficent philanthropy, intended to ward off, or mitigate, some of the evils that too surely may be expected to flow from the singular inclemency of the weather during the harvest. While he admired the motive that gave birth to these suggestions, and should have hastened to lay them before the public, he could not help regretting that his own experience had long ago convinced him of the moral impracticability of the measure recommended. If a reluctance to do any thing that might seem to check the glow of beneficence hath induced him to defer this intimation longer than would otherwise have been the case, he doubts not but the

same disposition of mind that dictated the suggestions will operate in pleading his excuse for this tardy notice.

Nothing can be more natural than for one who sees corn drenched with moisture from day to day, and in danger thus to be rendered unserviceable alike for man or beast, to wish, if it were possible, to withdraw it from that danger; and, as it is well known that artificial heat can be made to evaporate moisture, it was nothing wonderful, in one who has not had experience in things of this nature, to conceive that this kind of moisture might be so evaporated. Such was the idea of this worthy correspondent, who offered some ingenious hints for modulating a kiln for that purpose; but, alas! he was not aware of the magnitude of the operation, or the waste of fuel that would be required in such an operation! To satisfy this gentleman, and others to whom a similar idea may occur, the Editor, in regard to this particular, begs leave respectfully to state to them the result of an experiment that he himself made a great many years ago on a subject of this nature.

Towards the end of harvest, when he was yet a very young man, after all his corn had been got in but a very small part of one field, a succession of very rainy weather set in, which fell so thick day after day, without any intermission, as to keep the corn perpetually completely drenched with wet. Afraid that the corn would grow in that state, he caused it to be taken into the barn, and immediately threshed out; having plenty of cattle in the house at that time, the straw was given to them as fast as it was threshed, the greatest part of which was readily eaten, and the rest went

to the dunghill. The chaff was taken from the corn as quickly as possible, and the corn immediately carried to the kiln, where it was completely dried before it had time to begin to heat or grow. In this way the whole of the grain was entirely saved, but such a quantity of fuel was consumed in the operation of drying as would have purchased nearly the whole of the corn that was thus saved, had they both been brought to a fair market. But as the straw in every case of this sort will contain, in general, nearly four times the quantity of moisture that the corn does, and is of a proportionate bulk, it will be easy to perceive, from the result of this small experiment, that any attempt to dry corn with the fodder to it, when it is completely wet, must prove a very losing operation. The sun and wind are the only agents that can be successfully employed for dissipating this sort of moisture; and, when care is taken by the farmer *properly* to avail himself of their influence, it is surprising how much may be effected by them during a course of precarious weather. There is no doubt that, had all the farmers in this country been instructed by a continued series of precarious seasons to know in what way to conduct themselves *properly* in this respect, no wheat needed to have been lost during the present season; but, being freed from the necessity of watching occasions in ordinary years, they are not prepared how to act when it does at times occur.

Many other Favours received, will be more particularly noticed in our next.

ERRATUM.

Page 111, line 21, for "Stentorea," read "Fusca."

RECREATIONS, &c.

Nº 9.

AGRICULTURE.

Hints respecting the circumstances that require to be chiefly adverted to in experimental agriculture, particularly with a view to a proposal for instituting a national experimental farm.

ON THE VARIETIES OF THE SHEEP KIND.

[Continued from page 94.]

I HAVE heard of a breed of sheep in Cornwall that carry hair instead of wool; but having never seen any of them, I can say nothing concerning them: there is, however, a large breed of sheep in Lincolnshire which carries a weighty fleece of long *hair* that has commonly been called *wool*. Of these I judge from a specimen that was sent to me by Sir Joseph Banks. It measures no less than twenty-one inches in length; and the whole fleece, he informed me, weighed twenty-eight pounds. From a careful examination of the form of the filament, I conclude that it is hair, and not wool; and if so, the probability is, that the owners of such sheep will not perceive the wool to separate entirely from the skin at one season, and therefore

they will be at liberty to shear their sheep later or earlier, as shall suit their convenience. This hair was neither very soft nor fine, but strong, and very fit for being combed. This also seems to be an approximation to an original breed, though it is highly probable that it may have been altered in a greater or less degree by intermixture with some of the *wool-bearing* kinds that so much abound in this island.

The reader ought not to allow his mind to be impressed with any prejudice against this breed of sheep, because of the term *hair* applied to its fleece; for there is reason to believe, that *wool* is not necessarily either softer or finer than *hair*; though these two substances may perhaps have characteristic differences for manufactures which have not been yet remarked; because the distinction here brought under view has never hitherto, I believe, been adverted to. There is a breed of small sheep in the southern parts of Scotland called the *Lammer-moor* breed, which carry *wool* that is, in regard to coarseness and hardness, equal at least to the Lincolnshire hair, though it is not quite so long. These last sheep are of a small size, and have black or mottled legs and faces. These have probably been once an original breed also, but are now, doubtless, a mongrel race. Neither is the Lincolnshire *hair* nearly so hard as Spanish wool, if that could be found of nearly the same thickness of filament. The *hair* of the Bocharian lambs' skins is finer and softer than almost any kind of wool known, the Shetland alone excepted. Neither *wool* nor *hair*, therefore, are essentially distinguishable from each other either by their fineness or their softness; for there may be found coarse and fine,

hard and soft, of both kinds; and a fleece of the one kind may become more valuable than the other, merely from the peculiar purposes it is best fitted to answer being more or less in demand at the time. Neither is length or shortness a criterion of *wool* or *hair*. I once had a sheep of a very small size which carried a close fleece of very fine *wool* that measured eighteen inches in length, which was not much short of the Lincolnshire *hair* above mentioned. This wool was also of a very fine quality, strong, and elastic, and very soft.

These facts are necessary to be here adverted to, merely to counteract the effects of theoretic prejudices that have long been current; in consequence of which certain qualities have been incautiously connected, as if necessarily, with certain names. Coarse wool, for example, has been invariably called *hair*; and hence an idea prevails, that *hair* is always coarse, and *vice versa*. Long wool has been, in general, deemed coarser and harder than short wool, though innumerable facts (beside those just quoted) might be produced to show that no such connexion necessarily exists. In like manner it has been supposed, that length of pile in the fleece is, in some measure, connected with the *size* of the sheep; which is, in a degree, countenanced by the Lincolnshire fleece above mentioned, though this is a mere fallacious inference. The sheep just above quoted that afforded the fine long *wool* was of a small size, not exceeding eight pounds weight per quarter; Spanish sheep, which carry very short wool, are of a good size; and I have had sheep in my own flock that produced wool not exceeding

two inches in length of a very coarse quality, though the animal was of a puny size.

Neither is closeness of pile connected with coarseness of staple, as has been often supposed. Spanish sheep are well known to carry the closest fleece we are as yet acquainted with. The fine long *wool* above mentioned grew very close upon the skin; and I have seen a fleece of very coarse short wool so thin that the skin shone through it, much in the same way as is often seen on pigs. To eradicate vulgar prejudices of this kind by a collection of facts incontestibly proved by fair experiment, would be one of the important duties that falls within the province of the experimental farm; because it would free the mind from an overpowering load of fetters that have chained it fast down to a long train of hereditary errors for ages past.

The South-down sheep, distinguished for the fineness of its wool, and several other qualities: the Dorsetshire, yielding short wool, having their bellies bare, and being remarkable for bringing early lambs: the Ryeland, rather a small breed, with fine wool: the Welsh sheep, chiefly characterised by the elasticity and softness of their wool: the Norfolk sheep, with long legs and black faces: the Lincolnshire breed above mentioned, as perhaps the largest in England: the Tees-water breed, which approach to them in size: the Dunkers, the smallest sheep in England: the Leicester breed, now so celebrated for fattening early: the Cumberland mountain breed: the Lammer-moor and the Cheviot breeds, which are the most favoured breeds in Scotland: the Shetland, and other small

sheep in the northern regions,—seem to have been all original varieties, each possessing some prominent characteristical features, most of them now greatly changed by mongrel intermixtures; and are all very proper objects of comparative experiments, calculated to discriminate, with precision, the peculiar characteristics; so that the particular circumstances under which one kind ought to be preferred to another might be exactly known: for till this be done, every man who rears sheep may be said to be wandering in the dark; and, like the instance above given (p. 11), respecting the Blainzlie and Poland oats, two men, by adhering to improper breeds, may each have his profits diminished to less than one half of what they might have been had they mutually interchanged their live stock. Of all the prejudices I know, few are more hurtful in their tendency than that which rests upon the principle, that any one breed of live stock can be the best fitted for every purpose, and more profitable than any other in every situation.

Beside the varieties of sheep above enumerated, there are, no doubt, many others scattered over the wide surface of the globe, that have been never heard of in Europe; and a few that have been so slightly mentioned by travellers, or have been brought into notice by accidental circumstances that merely serve to mark some particulars respecting them, without conveying a precise knowledge of them. The most noted of these is the Persian breed of sheep, that are only known by their wool, which has long been a valuable article of commerce. This is known by the name of Caramanian wool, of which there are two

sorts, white and red. Neither of these kinds of wool have I ever seen, and therefore can say nothing of their peculiar qualities; but that these are valuable for certain purposes, is sufficiently indicated by the price, which is, in general (the red sort especially), nearly double to that of the best Spanish wool. A breed of sheep is also known to exist in the Crimea, whose lambs afford a valuable fur that sells at a very high price in China; these are probably a breed carrying soft silky hair. In the East Indian possessions subjected to the dominion of Britain, there are two breeds of sheep, both carrying wool, which have been no otherwise characterised to me than by the name of the large and the small sort. The mutton of these sheep is said to be so excellent, that persons who have been accustomed to eat it there often express great disgust when they return, at eating English mutton. In Africa also, many travellers have remarked, particularly Demanent, that there are two breeds of sheep, nearly alike common, one of which carries wool, and the other a fleece of long shaggy hair like the goat. It will be unnecessary for us to hunt longer after these, and other varieties in this place. It is sufficient for us to have thus proved, by a variety of facts, that there is no mode of reasoning by which we can determine *a priori*, what will be the nature of the varieties of the sheep kind which may subsist in any place; and that, therefore, we ought to have our eyes at all times open, to examine with care every kind that presents itself, so as to be able to mark with precision its distinguishing peculiarities, that we may see whether these can be made to turn out to our advantage or not.

From the enumeration above given, it appears that the varieties of the sheep kind are much greater, and more widely separated from each other, than has been commonly imagined; and that, in particular, the quality of bearing wool is by no means a characteristic peculiarity of the species. Though it would appear that the short-haired sheep have been less cherished in a domesticated state; yet, if the long-haired kinds be taken into the account, it seems to me probable, that not more than one fourth part of the sheep that have been reared by man do actually carry wool of any sort at the present moment; for the probability is, that nearly the whole of the sheep which graze upon the extensive plains of Russia, all those that are reared by the Tartar tribes, which inhabit the northern parts of Asia from Poland to China, and a great part of the sheep reared even in Europe itself, afford hair, and not wool. It is also probable, that the skins of the finest of these hair-bearing sheep, dressed as furs, bring a much higher price at market than a fleece of the finest wool would do. These facts, which have not hitherto been suspected, ought naturally to give a range to our investigations on this subject much wider than has been heretofore attempted.

The circumstance that has enabled us to discriminate the different varieties of sheep above enumerated is the fleece. This, as being the most obvious peculiarity of the sheep kind, naturally attracted notice in the first place. But we have no reason to suppose that there is not as great a diversity between different varieties respecting other particulars. To enable us to acquire discriminate notions on this head, it may be

of use to take a glance at the varieties of some other animals with which we are better acquainted as to this particular; for the general points of resemblance will be found to be such as to authorise us to draw some important inferences from analogy.

We have already seen, that the dog tribe is nearly as much diversified in regard to fleece, if the phrase may be admitted, as the sheep. The smooth greyhound and Spanish pointer are as bare as the Madagascar sheep. The shepherd's dog, of some kinds, the English spaniel, the Newfoundland, and many other kinds of water dogs, have long waved hair, like the Tcherkefsian and Bocharian sheep. A small variety of the king Charles's dog that I have seen, has soft long hair, covering a finer sort, like the Argali, or wild sheep of Pallas. A dog of a moderate size, one of which kind was long kept as a favourite by the late lord Gardenstone, and which are by no means uncommon, though the name I know not, carries a very thick fleece of long lank hair, very much resembling the Lincolnshire fleece of Sir Joseph Banks's sheep: and I have seen another variety with closer frizzed wool, which was shorn annually, and made into stockings by the wife of a man of the name of James Johnston, who lived many years at Mounie in Aberdeenshire. This more resembled, in closeness and texture, the wool of that kind of sheep which does not separate at the points, than any thing else to which I could liken it: nor were the stockings to be distinguished from others that were made of sheep's wool. I have since met with a variety of this kind of dog (at a smith's shop in Fetter Lane, London) which had

hair of the close curled sort above described, that for softness, fineness, and length of staple, exceeded many kinds of wool. But the finest hair I ever saw upon a dog, which indeed for softness and gloss more resembled silk than wool, grew upon a very small dog that was lately in the possession of Mr. Reeves, colour-man in the Strand, London, which, if manufactured, would certainly afford goods of uncommon softness and beauty. This is, I believe, the variety that is generally known under the name of the Maltese dog.

Hence we are led to perceive, not only that some breeds of sheep carry no wool, but that there are other animals which bear fleeces that are convertible to the same purposes in life as those to which the wool and other fleeces of sheep have been hitherto deemed exclusively applicable. Let us see if a similar correspondence can be traced with regard to other particulars.

The diversity in point of *size* between different varieties of dogs has been already (p. 16), taken notice of; and, though something of the same kind takes place between the different breeds of sheep, yet I do not find that the disproportion is nearly so great in this species of animals as in dogs. Dr. Pallas describes a male of the Argali that fell into his hands, which weighed, while entire, three hundred and ten pounds. He takes no notice of its being of a larger size than usual, or uncommonly fat. Hence, I think, we may conclude, that if the largest could have been selected, and fatted with the same care that our breeders in England sometimes use, it might have attained to the weight of four hundred pounds at the least. This I should take to

be the largest kind of sheep as yet known; as to the smallest, there is a breed of sheep called Dunkers, kept in Shropshire, which are said to weigh, when fat, not more than twenty pounds; if so, the difference between the largest and smallest sheep would be as twenty to one. Of this, however, I speak only from hearsay; but this I state as a fact, that I myself killed a sheep of the small breed, common in the northern counties in Scotland (nor was it a singularly small one of its kind), of which, when fully fat, one of the hind quarters weighed no more than five pounds and a half. This beast, when entire, would probably have weighed a little more than thirty pounds. If so, the difference between the largest and the smallest would be as fifteen to one; if it should have weighed forty pounds, the ratio would still have been as ten to one. From these facts we may infer, that the ratio between the largest and the smallest breed of known sheep may be as from *fifteen* to twenty to one.

So long as an idea pervaded the minds of men, that all the varieties of each species of animals were descended from *one* common parent stock, it was natural to deduce from this principle, as a corollary, that as the one of these varieties had been raised to its uncommon size, and the other depressed below the usual standard, merely from the co-operation of accidental causes, it would not be unreasonable to expect that they might once more return each to its original state, or that they might be brought back to it at will by artificial management. It does not, however, appear that facts corroborate this reasoning. Let the puppy of a mastiff be kept on a very spare diet, its bones will,

in due time, attain a size nearly the same with others of its own family, though its flesh will be very scanty. Let him be afterwards fattened with care, and upon these bones may be built a mass of flesh that will augment his bulk and weight to a prodigious degree. The same effect will be experienced in regard to every other kind of dog; and, from analogy, I would say of every other variety of animals. Let it not, however, be here understood, that I mean to say, that *no* difference can be made in the size of an animal by feeding it very abundantly or very scantily while young. That there will be *some* difference, even in the *bone*, I am not inclined to deny; but this difference, if any, is inconsiderable, when compared to the augmentation or the diminution of the fleshy parts, which is very great. Nor do I know a fact which can induce me to believe, that the general size of any variety of animals can be, upon the whole, either augmented or diminished by that means alone; on the contrary, I have already adduced a proof in the king Charles's dogs (p. 17), which seems to be conclusive, that the highest feeding, and nicest pampering, continued even for ages, has not been found to augment the general size of that class of dogs in the smallest degree. There will be *individual* variations in every family (see Vol. I, Natural-history, p. 62), which, if selected with care by a minute attention to kind, may produce a small variation without intermixture of blood; but that is a different thing from the food, and ought to be carefully discriminated from it. We shall have occasion hereafter to see what practical uses may be made of this kind of selection.

On the popular doctrine concerning extraneous

influences upon animals, on which so much stress has been laid by modern philosophers, I have already had occasion to animadvert under the department of Natural-history (Vol. I. page 51), to which the reader is referred for a refutation of this doctrine, and which I take notice of in this place only that it may not be overlooked. It is of much importance that the man who engages in improving the breeds of any domesticated animals, should have his mind fully impressed with a clear conviction of the very trifling influence that such variations can produce on his stock, further than as they may tend to augment or diminish their quantity of food; otherwise he will never be able to investigate circumstances with that liberal freedom of mind which is necessary for the discovery of truth. Let this be my excuse for lightly touching on it once more in this place.

A circumstance that the abettors of this theory have resorted to on all trying occasions, like the magician to his enchanted wand, for effecting their wonderful transformations, has been the influence of climate, which, under their hands, is capable of doing any thing they please. Let us here also subject their confident assertions to the trying test of experience.

An opinion so long prevailed in this country, that the fineness of *Spanish* wool depended much upon the peculiar temperament of the kingdom of Spain, that it was accounted ridiculous in any person to think it *possible* to rear fine wool of the same quality in Britain. It is not above seven years since I myself was violently attacked as a visionary by a worthy gentleman for whom I have a great respect, merely for hav-

ing hinted reasons for believing that the experiment might *possibly* succeed, and proposing that it should be tried. This gentleman took the trouble to write a pamphlet, the avowed purport of which was to show that the wool of the Spanish sheep must necessarily degenerate in Britain, and that it would be of no use to make the trial. Notwithstanding these so positive hypothetical assertions, the trial has been actually made; and, though no adequate measures have as yet been adopted for obtaining any of the *best* breed of sheep from Spain, yet several sheep of the fine-wooled sort have been brought to this country, and have been kept so long here (by the king and some other persons) as to prove beyond a possibility of doubt, that the fineness of the wool is *not* impaired in this country in the smallest degree; but, on the contrary, many think it has rather been improved. The sheep that have hitherto been brought from thence have not, indeed, possessed such qualities in other respects as to render them a favourite breed among us. The same fact is proved by the short-haired sheep sent from Spain to Sir Joseph Banks, which, alike in Spain as in Britain, carried short stiff hair, though surrounded with wool-bearing sheep in both countries. Innumerable other facts, beside those already incidentally mentioned in this essay, might be adduced, to show that the influence of climate in altering the quality of wool is very inconsiderable, and that in no case does it tend to make two breeds, which differ essentially from each other in this respect, approximate more nearly to one another when both are kept in one climate, than they would if both were kept in another

climate, on the supposition that equal care has been taken to prevent an intermixture of *blood* in both cases. There has been a breed of mottled sheep (brought originally from Spain) kept at Aislaby park (I think) in Yorkshire for nearly half a century past, which still retain all their distinctive peculiarities, if I be rightly informed, as pure as when first brought over. The wool of those sheep was in Spain of a very coarse quality, and of little value, as it is at this day in Britain.

From these and other considerations, I have found reason to conclude, that there are different *varieties* of the same *species* of animals, which are distinguished from each other by certain permanent peculiarities which remain unaltered for any length of time, under any variations of climate, and that they cannot be made to approach nearer together, far less to be confounded with each other, if the blood be preserved free from contamination by intermixture of breeds; and that the wool of sheep forms no exception to this general rule. Also, that if a male and a female of two of these varieties be made to procreate together, they will produce a mongrel race, in which the qualities of the parent breeds will be blended together in nearly an equal degree. That this mongrel race, being also prolific, may either be made to produce others of its own kind by being kept apart from all others, or may be made to produce a new kind of mongrel by being blended with some other breeds; and by this kind of mixture may be produced a compound mongrel race, in which may be blended all the qualities of the whole varieties of the species, or in which any

one peculiarity may be made to predominate in whatever proportion shall be required, or in which any other peculiarity may be totally abstracted at pleasure.

Such would, doubtless, be the power of man over the animals subjected to his sway, were he possessed of the different varieties in their original purity; but, where they are left to nature, these intermixtures will be made as chance shall direct; and of course, where one individual only of a particular variety shall be left to breed among a great flock of another variety, the distinguishable peculiarities of that individual will quickly disappear among its descendants; and, after a few generations, it will be no longer perceptible in the smallest degree. A change of this kind has been often observed to take place; and this fact has been supposed to afford a clear proof of the influence of climate or pastures in changing the distinctive qualities of the varieties of the same species. Thus easy is it for men, having the best intentions, to slide imperceptibly into error, where accurate distinctions are not strictly attended to. I cannot therefore too often, or too earnestly, recommend to my readers to be particularly attentive to remark every circumstance that can tend to have any influence on an experiment; for experiments, without this kind of accuracy, are not only not useful to man, but peculiarly baneful, because they tend to establish error instead of truth, and to make it be cherished with a degree of obstinacy that would not otherwise be experienced. Perhaps nine tenths of the experiments in agriculture are of this kind.

NATURAL HISTORY.

On the various ways adopted by nature for the propagation and preservation of animated beings.

[Continued from page 114.]



CLUSTER polypus. The *polype a bouquet* of Trembley—VORTICELLA *umbellaria* & *anastatica*, Linn. Both the varieties of the polypus tribe, which now engage our attention, belong to the division named vorticella by Linnæus, on account of a particular kind of circular motion produced by the short arms, or *ciliæ*, which are placed around the lips of all this species, for the purpose of drawing insects into their mouth. Their mode of natural propagation differs considerably from the hydra above described.

Mr. Bonnet, in his "Contemplations of Nature," when he comes to examine these minute beings, describes them in the following animated manner:

"Look into that rivulet, the bottom of which is covered with the fragments of plants; what do you perceive upon that broken branch of a tree? Tufts of mouldiness. Do not deceive yourself; that which you take for mouldiness, is not what it appears to be. You suspect it already: you think to ennoble it a good deal by elevating it to the rank of a vegetable. You conjecture that these are plants in miniature, which carry flowers and seeds; and you plume yourself on the idea that you do not judge of that mould like the vulgar.

"Take this magnifying lens: what do you discover? Very pretty bouquets, the flowers of which are bell-shaped (*a*). Each bell is supported by its little pedicle, which springs from a common stalk: you no longer doubt of the truth of your conjecture, and I cannot detach you from that microscopic parterre.

"You have not, however, sufficiently observed it. Fix your attention on the mouth of one of the bells: you there perceive a very rapid movement, which you cannot enough contemplate, and which you compare to that of a mill. That movement excites in the water little currents, which draw towards the bell a multitude of corpuscles, which it swallows, and which are there dissolved. You begin to doubt whether these bells are real flowers; and the movements, apparently spontaneous, of the stalks augment your doubts. Continue to observe; Nature herself will teach you what you ought to think of that singular production, and

will furnish you with new motives to admire the fecundity of her resources.



“ Observe that bell which detaches itself from the bouquet, and swims away to fix itself upon some other support. A short pedicle is observed at its extremity, by which it fixes itself; that pedicle lengthens, and becomes a little stalk. This is no longer an umbel which you have under your eyes, it is a single flower only. Redouble your attention; you approach the most interesting moment. The flower is shut: it has lost its bell-like form, and has assumed that of a button. You suspect, perhaps, that that button is a fruit, or a seed, which has succeeded to the flower; for you can with difficulty abandon your first conjecture. Do not lose sight of that button: see, it begins to divide by little and little lengthways. The stalk is already surmounted by two buttons smaller than the first. Examine what passes in the one and in the other. They open insensibly, and you observe on the sides of that opening a motion, which accelerates in proportion as the button expands. Already the little mill appears, and the two buttons have assumed a bell-like form.

“ Can a fruit, which changes into a flower, be a real fruit? Can flowers, whose interior is animated, and which swallow little insects, be real flowers? Relieve your eyes for a time from the fatigue of watching these minute objects so nearly, and return to observe them after a few hours. - - - - -

“ Your flowers are now shut, as at first; you easily divine that they are about to divide as before, then to open and give you four bells. It is already done, and you have a little bouquet formed of four flowers. If you continue to observe, you will see it increase by succession of one into two; immediately you count sixteen—thirty-two—sixty-four flowers.

“ Such is the origin of that microscopic parterre which at first attracted our attention: how much more admirable it was than you at first conceived it to be!” You now easily perceive, that this seeming plant is a real animal, which increases naturally in the manner you have seen. They can thus detach themselves from the stalk when they will, or continue upon it as long as they please. Each individual has the power of closing itself up while others are expanded, and thus it seems to bear at the same time flowers and berries. If any object slightly discomposes several contiguous individuals, they all close up together, and the umbel of flowers is changed into a cluster of berries. If the agitation be so great as considerably to disturb the whole cluster, they shrink up together, forming one solid cluster: they can even fold down their stalk, so as to appear only a misformed mass at the bottom. When the threatened danger is over, they again gra-

dually expand, and the umbel displays itself once more in all its beauty. "What a crowd of wonders (continues Bonnet) does a tuft of mouldiness present to the attentive observer! What interesting, varied, and unexpected scenes are presented! What a theatre is exhibited to a thinking mind! But our powers are so limited, that we can only get an imperfect glimpse of the objects of nature: what would be our ecstasy if the whole were fully displayed to us, and if we could penetrate even into the interior structure of that marvellous assemblage of living atoms! Our eyes see only the gross parts of the decorations, whilst the machines that excite them remain in impenetrable darkness. Who shall illuminate that profound night? Who shall penetrate that abyss in which Reason loses herself? Who shall display the treasure of power and of wisdom which it indicates? Let us learn to be contented with the small portion which is communicated to us, and contemplate with gratitude these first traces of human intelligence that are imparted to us concerning a world that is placed at such an immense distance from us."

"Take again your microscope (it is Bonnet who still speaks), and consider this other bouquet (*b*). It is not formed precisely like the former. Its flowers are also bell-shaped. From the main stem, it is true, spring out smaller stems, or lateral branches; but these branches themselves carry smaller subordinate branches. At the extremity of all the branches, and of every twig, is a bell. Touch that bouquet slightly, it folds itself up in an instant, and becomes a kind of irregular roundish mass. Wait a moment, and you will see it expand anew. The stalk and its branches

spread out, and offer to your view the agreeable spectacle of their bells.

“ You now know that each of these bells is a polypus; that the opening of each bell is, in some sort, the mouth of the animal, and that this singular assemblage composes only one organic whole, formed of a multitude of particular and similar wholes. This is a new species of society, of which every individual is a member one of the other, in the strictest sense of the word, and all participate of the same life.

“ How do you think that this branching polypus propagates itself? You do not hesitate to say, that it is by the natural division of its bells, as in that which you have just now been admiring. Suspend your judgment if you please; observe, and learn at the polypus school to distrust analogies. Perceive you nothing in all this assemblage but branches and bells? You discover here and there upon the stem, and among the branches, little round bodies; a kind of bulbs, very much resembling the gall-nut on plants. Observe one of those bulbs with attention. It is very small, but it grows quickly larger, and in a short time you see it greatly exceed the bells in size.

“ Your curiosity increases, and you are impatient to know what this bulb is, and what it will become. Do not try to divine, suffer Nature herself to speak. See, your bulb, which detached itself from the stalk, swims away to fix itself upon a plant. It attaches itself to that body by a short pedicle, which lengthens a good deal in a few hours. The bulb loses, by degrees, its spherical form, and becomes an oval button. This button divides lengthways into two others smaller,

but still a good deal larger than the bells. Soon they divide again into two others, so that there are now four buttons on the same stalk. Each of these divides again, and gives you eight buttons: quickly you count sixteen. Each of these adheres to the stalk by its own proper pedicle, but they are not all of equal bigness. The largest continue to divide, the smaller begin to open and discover their bell shape. These are perfect polypi; those have not yet completed their process, they must undergo new divisions before their organs be fully displayed.

“ You have now got the word of the enigma, and you are forced to acknowledge that you never could have divined it. Could an inhabitant of Saturn divine the history of an acorn or an egg? What plant, what animal could lead us to suspect the existence of the bulbed polypus?

“ But this bouquet, which has been formed under our eye, is not so well furnished with bells as that from whence the bulb was detached. Will it remain such as it is, or will it increase farther? If it does increase, will it be by means of other bulbs? You dare not attempt to guess. Our polypus has read you an excellent lesson in logic, and you confine yourself to observation alone.

“ One of these bells is closed; it has become round as a button; you see it divide. The same division takes place in other bells, and in less than twenty-four hours you count more than a hundred bells in that bouquet which originally contained not more than a score.”

The varieties in the manner of procreating among

this singular species of insects are very great. Instead of parting in two longitudinally, as in the two instances last specified, the *polype en entonnoir* (c) of Trembley, so called from its tunnel-like shape (the Hydra Stentorea of Linnæus), though it be propagated by a natural division also, has that division effected in a manner totally different. This little creature, which is so minute as to require a magnifier to observe it rightly, attaches itself singly by its tail to any fixed body that it finds in the water; and, extending considerably in length, it gradually widens towards the mouth, which spreads open, resembling, in some degree, the mouth of a trumpet that has not been spread to its full width, nor perfectly regular, one edge of the lip being, in general, somewhat lower than the rest of it. A cluster of these polypi has so much the appearance of a tuft of one of the smallest kinds of cup mosses, that it might be mistaken, by a slight observer, for a variety of that kind of moss. When this little creature is about to become a mother, it closes its lips, and then it bears a perfect resemblance to a longish club. After it has remained in this shape a few seconds, you will observe a small mark of swelling near the thick end or point of the club on one side. Soon after that you may observe a mark passing transversely from thence, and obliquely towards the tail on the opposite side. This mark becomes every instant more distinct: the swelling below it becomes more perceptible towards the head, where it soon begins to divide, gradually opening obliquely downward in the direction of the line, till it at last becomes two separate bodies; the last point of adhesion being at

the lower edge. These do not, however, continue to adhere together, as in the former instances, but very soon they separate entirely; the part that is detached swims away and fixes itself to a proper support, and in a very short time both have assumed the perfect form of the species, and ere long propagate again after the same manner.

There is yet another kind of polypus described by Mr. Trembley, which propagates in a manner totally different from any of those creatures which we have hitherto had occasion to notice. This kind of polypus is always found in groups, attached to each other by their tails, and all together they fix themselves to any object they meet with. Their bodies are extremely transparent. When they are narrowly observed, you can perceive within each of them a kind of whitish *nucleus* gradually forming, which soon assumes an oblong shape, and is, by little and little, extruded from the body, and remains for some time attached to the exterior surface of it. These little bodies seem to be a sort of eggs; but of a kind that differ from all others yet known. They have no crustaceous or membranaceous envelope of any kind. We cannot say, therefore, that these eggs are hatched; we can only say, that these oviform bodies are developed. In a few minutes that developement is completed (more like the unfolding of a chrysalis when it assumes the insect form, than any thing else to which it can be compared), and it is now a polypus the same as its mother. Imagine to yourself (says Mr. Bonnet) a bird which shall be extruded from the body of its mother entirely naked, with its members closely folded up in

the form of an oblong ball, whose members gradually unfold themselves, and you will have a perfect image of the birth of the *polype en nasse*, for so Trembley calls this variety.

Mr. Trembley says, that each of the polypi of this sort has continually adhering to itself a cluster of these oviform bodies, one of which it, for the most part, produces each day. That when the vital faculties of these young are sufficiently expanded they move about among the mafs, nor do they quit it until they have united themselves to several others in the same state of forwardness with themselves. When this is effected they quit their mothers altogether like a hive of bees, and continue ever after attached to each other. This groupe thus forms itself into a kind of sphere, which, when it is swimming, turns, in some measure, upon its axis, the motion of each individual contributing towards the movement of the whole. Sometimes one or two of these young families will separate from the mother groupe in one day.

The sea anemony is a variety of the numerous tribe of animals of the polypus kind, whose natural mode of propagation is considerably different from any of those above enumerated, and not more analogous to that of vegetables than any of them. These animals, after having remained for a certain length of time attached to some fixed object, voluntarily detach themselves from it, leaving behind them a few small shreds of the under part of the stem, or tail (as it may be indifferently called) adhering to the substance to which they were fixed. These small fragments become the matrix of young anemonies, from which they spring, as young mushrooms, from the stringy spawn that

had been buried in dung for that purpose, after the mushrooms that formerly sprang from it had been taken away.

There are still other varieties in the mode of propagating polypuses and other animals; but a longer enumeration of these would only prove tiresome to the reader. The above examples are quite sufficient to show, that the variations which occur in nature in regard to this particular are such, as no person who has been accustomed to form his opinions in this respect from the common objects that most attract his notice around him, could possibly have conceived; and, while they display the power of the Almighty Creator of all things, ought to humble the pride of man, and give a check to that presumptuous vanity which too often prompts him to form decisive opinions *a priori*, concerning things that his weak and finite judgment never can be able in any wise to comprehend.

I shall close this essay with taking a slight glance at a few of the means that have been adopted by nature for *preserving* animal life under circumstances which usually prove destructive to it, and thus become the means of propagating animals in situations where they never could have otherwise been found, which will give us some idea of the circumstances that have contributed to cherish the idea of spontaneous generation, which once prevailed so generally in the schools as to blind the understandings of men, and bewilder their imaginations to such a degree, as to give rise to many chimerical notions, which the experience of modern times hath hardly been able as yet completely to eradicate.

MISCELLANEOUS LITERATURE.

Thoughts on the origin, excellencies, and defects of the Grecian and Gothic styles of Architecture.

Amicus Plato, sed magis amica veritas. CICERO.

Grecian Architecture.

IN the earliest periods of society, it is probable that the first hovels erected by man in every country, for protecting himself from the inclemencies of the weather, were formed of boughs of trees interlaced, and covered with leaves, or grafs, or reeds, by way of thatch. As the inhabitants of the earth advanced in civilization, and invented tools adapted for cutting down large trees, for shaping wood into various forms, and joining different pieces together, structures of greater durability and elegance began to be erected of timber. The circumstances which gave rise to the idea of what we have since called the *orders* of Grecian architecture, have been so often detailed, as not to require to be here dwelt upon. It will be enough for us, at present, barely to remark, that the stems of trees cut over at one uniform length, and placed in a perpendicular position at a regular distance from each other in a straight line, as posts to support a superincumbent roof, were evidently the prototype of *columns*: that beams laid along their tops, so as to connect them together, and keep them in their true position, formed

the basis of what was afterwards called the *architrave*: that the end of cross-beams serving to connect the two sides of the structure together, and resting upon the architrave, afforded the first hint for the triglifs in the most distinguished of these orders: that the thatch cut in *talus*, projecting over the side walls, suggested the notion of the *cornice*; and that the end view of the triangular roof, with boards fastened by means of small girders, connected with the sloping wood of the roof, for the purpose of securing the thatch from being carried away by the wind (many very perfect models of which may be seen at this day in the country cottages of England) was the original of that kind of ornament which hath since been called a *pediment*. All these things are such obvious truths, as to require merely to be stated, in order to be unequivocally assented to. As to the manner in which the lesfer ornaments which constitute the characteristics of the five orders, were introduced, I do not mean to take up time in detailing them, because I do not think them of sufficient importance to require a discussion in this place: besides, these have been so often repeated in elementary books of architecture, that no one who wishes to investigate such particulars can be at a loss to find them; so that I willingly here decline to enter upon this common place investigation.

For many ages after the Greeks had discovered the beauty of posts symmetrically arranged, supporting a roof on the outside of a wall, or other building, and had felt the pleasure which an area thus protected from rain, and shaded from the sun, afforded in a warm

climate. Such *porticoes*, as these covered walls were then called, must have been accounted among the highest luxuries that the natives could enjoy; for there men could walk at all times in the open air, though screened alike from the inconvenience of wet and heat. Among a people, who were naturally inquisitive and loquacious, as the Greeks were; who had no means of obtaining instruction or information of any kind, but by oral communication with each other; whose laborious operations were all performed by slaves, and where they must, of course, have had much idle time upon their hands, it is no wonder if such places were held in the highest degree of estimation, and of course it must have happened that the ingenuity of their best artists was employed in arranging their columns with the utmost symmetry, in adjusting the proportions of the several parts, and in polishing and decorating all such structures in the most elegant way that their imagination could devise. That the Greeks therefore should become so fond of this kind of architectural decoration, as to deem it an essential feature of grandeur and elegance, and an indispensable adjunct to every public building, is what was naturally to be expected; and there can be no doubt but many thousands of structures, the memory of which has long since been totally obliterated, were thus ornamented, long before an idea was entertained of erecting any of those durable structures, the vestiges of which have been preserved even to our days.

As Greece advanced in civilization and in wealth their artists became acquainted with the means of preserving the remembrance of the heroes whom they

respected, and the deities whom they worshipped, by cutting their figures in marble. To display these statues to the best advantage, it was necessary that they should be placed on pedestals to elevate them to a proper height above the level of the ground. It was natural for the artists to wish that these pedestals should be formed of materials equally durable with the statues themselves: nor would it be a difficult matter for the statuary so to fashion those stones as to give them the stability required, and the form that seemed best to accord with the purpose intended. There is great probability, that it was in this way they first began to form an idea of what we now call *masonry*. How many ages it might be, after they had first discovered the beauty and conveniency of colonnades, before the first hint of the art of masonry was suggested, it is impossible for us now to say; but we may naturally conjecture, that a very long time must have elapsed after the first discovery, before they could form the bold idea of erecting a large building, constructed entirely of that *everlasting* material, as they would naturally suppose marble would be. But when the mind of man has once conceived a great idea, it can scarcely be relinquished: it broods over that idea continually; and one difficulty being at length surmounted, affords encouragement to go on, in hopes that others may in like manner be overcome. In this way they would come by degrees to see, that it was possible to rear the *walls* of a public structure of stone to the height required. For we well know, that these walls in general consisted of very plain work, having few apertures in them that might tend to embarrass

the operator; and even this step, how ever easy it may seem to us who have been accustomed to see walls reared of stone every day since our earliest infancy, must have appeared to be a stupendous exertion of human power to those who beheld it for the first time; as will appear obvious to any one who shall look endways at a thin wall raised to a great height before it be covered in with a roof, if the scaffolding has been removed. So very insecure, indeed, must such a wall have appeared to be, that I am satisfied it could only be by degrees that they would venture, from the experience they had had of the strength of low walls, to add by little and little to their height, and at different times, as occasion called for it, that they came at last to be satisfied of the practicability of rearing even such plain walls to the height to which they were carried in those temples.

But the greatest difficulty yet remained. A public building, without a colonnade annexed to it, could not be tolerated in those days; and how to erect a colonnade of marble, in the state of their then knowledge of masonry, that should, in any respect, resemble those which they had been so long accustomed to idolise, must have been a very difficult problem to solve. They had been so long accustomed to admire the symmetry of their columns, and the conveniency that the colonnade afforded, that they would never once dream of any thing as a substitute for it. One device only for getting over this difficulty remained: it was, to preserve the form as much as possible, but to alter the proportions of their columns, so as to bring it within the compass of their power to execute it with the ma-

terials they had chosen. For this purpose, instead of the slender wooden posts that had been before in use, they found it necessary greatly to augment the diameter of the column, so as to give it the solidity of a pillar capable of supporting the weight that was necessarily to be laid upon it. And as it was impossible to get a solid stone that could run along the whole length of the colonnade, as the *wooden* architrave used to do, it was necessary to place these columns so near to each other as to admit of one block of stone to reach from one column to the other, so as to have one end to rest upon each column, and thus to bind them together, as the architrave used to do. Thus was the intercolumniation diminished to that inconvenient proximity to which, ever since that day, the followers of Grecian architecture have thought themselves obliged to adhere. A circumstance this which must have struck those who saw it for the first time as a prodigious defect; although, on account of the supposed impossibility of avoiding it, and the idea of grandeur that would be annexed to this mode of building, on account of the difficulty of constructing it, and the amazing expence it would cost, compared to that of former structures of the same sort, they would strive to reconcile themselves to it: and soon they would be able to do this, if the ideas of people in Greece were in any respect like those which prevail in the modern nations of Europe, among whom a new fashion, if it be only sufficiently expensive, will never fail to be deemed the quintessence of elegance, however absurd and inconvenient.

Be this as it may, there can be little doubt that it

was from the circumstances here explained, that the proportions of the Grecian columns and their intercolumniations, which have been adhered to ever since, were first established; proportions which, though it may by some be deemed worse than sacrilege to speak of them as I now do, will for ever prevent this ornament from being conjoined, without incongruity, with the convenience that private buildings require; or perhaps with that of public buildings, without producing unnecessary clumsiness and comparative inconvenience and inelegance, if persons whose judgments are unprejudiced are to decide. But on this subject I shall not now enlarge.

After the people of Greece had once reconciled themselves to the idea of the superior grandeur of marble columns when compared with those of wood, colonnades of the latter kind would naturally fall into disuse, except in those meaner structures which were erected solely for the purposes of convenience; in regard to which, cheapness being chiefly considered, every kind of unnecessary ornament would be entirely avoided. The superiority in point of elegance of marble columns above those of wood, would then come to be indisputably and universally recognised; so that no public building of considerable note could be erected without the necessary appendage of a marble colonnade, in front at least, if not on each side the building. And we can accordingly trace this form in almost every temple of ancient Greece, the memory of which has reached the present day.

But although the Greeks, in the most flourishing period of these petty states, were so far acquainted with

the art of masonry, as to be able to rear temples and other public buildings of stone; yet it does not appear that ever it was customary among that people to erect private buildings of these costly materials. We have every reason to believe, that the private habitations of individuals were, in general, formed of wood, or other cheap materials; and that convenience, rather than elegance, was principally attended to among them. We know also, that in Grecian temples it was *external* grandeur and elegance alone which was studied, and that *internal* decoration of every sort was comparatively disregarded. Indeed the area contained within the walls of these temples was so small, as not to admit of any ornaments of a grand style; and they were in general buried in such deep obscurity, as not to allow ornaments of delicacy or elegance to be seen, had they been there attempted. Under these circumstances, the architecture of such a people must of necessity have been extremely imperfect, as it must have remained defective in many of those particulars which will ever be deemed indispensably necessary for the accommodation and convenience of a wealthy and luxurious people; those especially who inhabit high latitudes, and who, by being under the necessity of living much within doors, must find that internal conveniency and elegance in private houses are, to them, of more indispensable necessity than those external accommodations which were so much, and so justly, admired among the Greeks.

From these considerations I am led to infer, that if the prosperity of Greece had continued for a sufficient length of time, to have enabled them to discover the

deficiencies of the art of architecture, which they had begun to cultivate only in *one* of its branches; or, if the private wealth of individuals had so much augmented as to introduce a taste for domestic pomp; or, if the nature of the climate and other circumstances had concurred to make public buildings of great extent necessary for the accommodation of the people, in which men could be protected from the inclemencies of the weather without being deprived of light; I cannot entertain a doubt that the lively and inventive genius of the Greeks would have supplied those deficiencies under which their system of architecture, as it has been transmitted to us, most evidently labours. But this not having been the case, we have now to lament, that an idolatrous veneration for that people, who, in many respects, are indeed justly celebrated, should have so far stupified the minds of all succeeding generations, as to have prevented them from ever thinking of supplying these defects: nay more, to such a height has this infatuation been carried, that after those defects of Grecian architecture have, in one particular at least, been supplied in the most complete and happy manner, so as to display an unrivalled combination of elegancies and conveniences, which it would have been deemed impossible ever to attain, if it had not been actually carried into execution, and which exhibits a stretch of human powers that is perhaps unequalled in the history of arts, this sublime invention has been contemned and vilified, even until the present hour, instead of calling forth those sentiments of reverential respect which the contemplation of superlative excellence ought ever

to excite. But as the splendour of the sun is lost upon the blind, so are the operations of superior genius upon the minds of those who are bemired in ignorance, or benumbed by prejudice.

It does not appear that the Greeks ever entertained a thought on any other department of architecture than that which respected the polishing, ornamenting, and adjusting their favourite colonnades; and concerning even that favourite object we are able to discover that they, like every other class of mankind, had a tendency to imitate what they had seen, and to be blinded by the prejudices which they had imbibed in their infancy; and thus have established rules which a sound judgment and chastened taste (the basis of which must ever be common sense) never could have authorised. For example: nothing is more beautiful than the stem of a growing tree which has a gradual taper as it ascends from the root, because no other form, in an elastic body, could be so well suited for carrying the weight of the top it has to support, and for resisting those strains to which an object unsupported above must be subjected when agitated by the wind. Nature furnished them with this model; and, to save the trouble of unnecessary workmanship, they were not at the pains to reduce the bottom of their posts to the same thickness with the top, when they formed them into a colonnade, although there was not now the same reason for the taper form that formerly existed. Thus far, while the materials consisted of wood, there might be little to blame; because the columns were certainly not weakened by that means, and they undoubtedly could be afforded at less expence. But

when the columns came, in process of time, to be made of stone, no such argument could be adduced for adhering to the taper form. In this case, a column is to be considered in no other point of view than as a perpendicular prop, consisting of incompressible and unelastic materials, which, of course, is as strong as it can be, in as far as respects its form, when it is of an equal thickness in every part; so that the thickness at the bottom is a mere useless waste of materials. Yet, from being in the habit of viewing wooden columns of that form, their eye had become so far accustomed to it, as no doubt to make them deem it elegant, so that they formed their columns of stone after the same model. The power of habit operates equally upon the minds of those in our day who have been accustomed to contemplate with admiration the works of Grecian architecture, as in all respects perfect; and they would, I doubt not, consider it as a great inelegance were a colonnade, in any case, to be erected in which the columns were equally thick throughout their whole length. But that this decision originates merely in the prejudice that I have just indicated, I think it will not be difficult to prove. Every person of judgment and taste will readily admit, that any kind of prop (the column alone excepted) that was reared of masonry for the purpose of supporting a weight, would be executed in a very bad taste indeed if it were made of a taper form. I conclude that this would be the case, from the invariable practice of all the best architects, even those who have formed their taste on the Grecian model, none of whom in any other case, excepting the column alone (or its sub-

stitute the pilaster) ever deviate from the perpendicular form in any sort of pillars. Let me ask any person who thinks himself qualified to judge in this case, what opinion he would have formed of the taste of Inigo Jones, if, when he erected the Piazzas in Covent Garden, he had made the pillars to taper inwards at the top, instead of rising to their whole height in a perpendicular direction, as they now do? This case is so exactly in point, and the answer so obvious, that it is unnecessary for me to push the illustration farther.

The Grecian artists, however, have run into one other deviation from the principles of common sense, and therefore of good taste, in the form of their column, which can be traced to the same source of imitation as the former; and we, from the same cause, have been induced to follow them in it. The reader will easily perceive that I allude to the swell in the column, of which some artists have been so much enamoured, as to deem it an essential requisite of the most indispensable necessity. For the origin of this defect we need not long be at a loss. Every person acquainted with the force of timber must know, that if a wooden prop were so much overloaded as to be obliged to bend, the yielding would take place toward the middle sooner than at any other place; of course, it would not be rendered in the least weaker by being made smaller at either end than in the middle. On this principle, while wooden pillars were still in use, the practice of making the column swell a little more towards the middle might have come into general use, as a way of obtaining equal strength with a smaller

quantity of materials; but as the top of the post was naturally smaller than the base, that would be left in its natural state, while the bottom part only was somewhat diminished in size. This form of the wooden column being thus introduced, it might come to be deemed judicious, and thus be rendered fashionable, and of course be deemed elegant. In this state we may suppose things stood when the Grecian artists conceived the idea of making columns of stone; and, from mere habit, as we may naturally suppose, they adopted that form in preference to any other. After what has been just said, it will be unnecessary to demonstrate the inutility and inelegance of this farther deviation from the principles of true taste in the formation of this favourite object.

When men have, by imperceptible degrees, contracted an overweening fondness for any object of taste, it is surprising to see how far they may be carried into the regions of absurdity without being able to perceive it. Even in Greece itself, where we have been accustomed to believe that no deviation from elegance or propriety in the fine arts could be tolerated, we might find numerous illustrations of this maxim; it will not, therefore, be surprising if we meet with many more proofs of it in Rome, where they did not so much as pretend to think for themselves in regard to this particular. They thought they never could be wrong if they imitated any thing relating to the fine arts that had ever been practised in Greece; and, like all imitators, they went far beyond their patterns in every species of absurdity, though they were unable to equal them in the finer departments of the art. These rough warriors contracted at last such a feverish

fondness for the Grecian column, that they seemed to think nothing could be excellent in architecture where that ornament was omitted; and that they could not in any case go wrong if their buildings were only sufficiently crowded with this favourite object. Impressed with these ideas, and forgetting the original use of the column, which alone could ever give it either utility or grandeur (viz. that of standing isolated from a building for the purpose of supporting a roof calculated to afford shade and shelter from the inclemencies of the weather, while the air was still allowed to circulate freely), they busied themselves in sticking columns close upon the wall. At the first we may suppose they made only one row of these mock columns; but by-and-by, diminishing their size, they mounted them in rows, as if upon stilts, one above another, till at length they reached the very pinnacle of perfection, by exhibiting four at least of the five orders of architecture on one building (the Colissæum), stuck upon the wall one above the other, in numbers innumerable, round the whole of the pile, like different stages on a cake of gingerbread; with this striking difference between them however, that it is very easy to bring the eye into such a position as to see every part of the gingerbread cake equally well; but in regard to the building this could not be done. The eye preserves, of necessity, the same elevation nearly when it examines each of the five orders; so that, if the first row of columns be at such a distance and elevation as to allow of all the members being distinctly seen and in due proportions, the last row must be so far off as to make all its members disappear, which is, perhaps,

a fortunate circumstance; for if they could have been seen, they would have seemed to be so distorted, and so disproportioned in magnitude to the great whole of which they formed a part, as to appear ridiculously puerile. After they had come this length, the flattening the columns, which they then denominated *pilasters*, was a natural step. It was an improvement so far as this, that it did not so conspicuously break the surface of the wall. It would have been a farther improvement still, if they had diminished the projection from the wall to the greatest possible degree; and then there would have remained but a slight step to have introduced the greatest improvement that this particular perhaps admits of, I mean that of omitting them entirely.

I am not unaware of the risk that I run of being despised by a certain set of men for speaking with such contempt of a practice which has been sanctioned by the greatest architects of modern times; and were I in expectation of being employed as an artist by men of a certain description, or were I a candidate for a seat among the learned society of the *Dilettanti*, perhaps I might think it prudent, like many others, to chime in with the multitude, rather than run the risk of losing the favour of some one of great wealth or power who dares not move an inch from the track that has been beaten before him. Disclaiming every pretension to the distinguished honour of ranking in either of these classes, I resume the native freedom of a man, which is, to think for himself in all cases, and to disclose his ideas without reserve wherever he thinks that they may have a tendency to enlarge the human

mind, to augment the powers of man, and neither to disturb the peace nor injure the property of others. Bigotry, of every kind, I consider as the greatest enemy that is to be found in this globe to the progress of man in every useful pursuit; because, considering the endless diversity of forms it assumes, its influence is more universal than any other enemy whatever; for, perhaps, no one person who breathes is entirely free from its influence. It becomes the duty therefore of every lover of mankind to drag to light this blind perverter of truth wherever they can discover him lurking under any kind of disguise, and to expose him in all his native deformity. I do not forget that there was a time when that person who had but expressed a doubt of the infallibility of the Pope, would have been viewed with horror by many wise and good men; neither do I forget that honest Wickliff, during that dark period, though at the risk of all that was dear to him, ventured, in some cases, to utter the dictates of common sense in opposition to the stream of prejudice around him. The impression he made at the time was seemingly small; but it became more powerful as the subject was more nearly investigated, till at last the spell was broken, and the infatuation was totally done away. Had he respected prejudices, and had others done so still, because great and worthy men had been drawn away by them, these prejudices might have still prevailed. While, therefore, we venerate the real attainments of eminent men in every department, let us not respect their errors. A time may come: nay, a time will come, when that blind veneration which hath for so many ages prevailed in favour of every

thing that is in any way connected with Grecian architecture will be done away, and when we shall be able to view these things as they really are, and reason upon them as freely as upon most other subjects, without either favour or prejudice; for, *Magna est veritas, et prevalebit*. Then will men wonder how it was possible that things so obvious should not have been perceived by many who were undoubtedly possessed of talents which exalted them far above the level of those who will then be able so clearly to see, and justly to appreciate their involuntary aberrations.

[To be continued.]

To the Editor of Recreations in Agriculture, &c.

SIR,

THE moment I received your Recreations for October, and cast my eye on the running title of Mr. Hairbrain's Essay on Domestic Economy, I hoped I had at last found a man of congenial sentiments; and on an attentive perusal, I was not mistaken. Now, said I, let me go into a writing partnership with Mr. Hairbrain, and who knows but our united efforts may in time bring back old-fashioned economy? The illusion is at least pleasant and harmless, and we may amuse ourselves with the speculation, as we amuse ourselves with speculations on peace, cheap times, and other distant objects seen in the off-skip of the political scenery. Economy, as a topic, has long been a hobby-horse of mine, although, alas! in a luxurious metropolis, I can seldom ride it with safety.

Economy is one of the most unpleasing subjects a man can start in conversation. It is like what the divines call an *awakening* sermon. Whenever it escapes my unguarded lips, I tremble and look round to discover by their countenances, if I have not given a personal affront to some of the company.—Not that the word itself is so very obnoxious. Many people are very fond of making use of it; and there is never much difference of sentiment but when they strive to discover whether it has any meaning.

I have heard it said, that it is *nonsense* to talk of how cheap our ancestors could live; the value of money is greatly different, and if we now have more expences, we have more plentiful means to defray them. Some have also said that the present age is more favourable for the increase of wealth than was the case an hundred years ago. A miser now (the character, however, is almost extinct) has no occasion to lock up his money in strong boxes, and to live in continual dread of thieves and house-breakers. He places his money in the bank, where it becomes most prolific, without any effort of his, or any apprehension of safety. Then, say they, as an antagonist to this, if by this means we accumulate more money, we have more occasions for it; and if we have more occasions, we have more money, Q. E. D. And thus, taking one circumstance and taking another circumstance, and making a pretty piece of patch-work logic, we prove that we are neither better nor worse than those famous ancestors to whom musty moralists are perpetually referring us. Here we have the simile of the large glass and the small one. Our ancestors had

the small glafs, and it was full; we have the large glass, but it holds more, yet the contents are the same.

With all due respect, however, to these opinions, which are so finely calculated to make the ends of the earth meet, and to make one century appear as like another as if it had been contemporary, or as if men and manners had always stood still, I must take the liberty to say, that there are many circumstances of a novel kind, which were totally unknown to our ancestors, and which have rendered economy with us a matter of some difficulty, and in most cases totally prescribed by the established laws of fashion. It is not my intention to examine the whole of these circumstances (for you cannot, Mr. Editor, spare me the whole of your publication), but having been for many years father of a numerous family, and having compared the conduct of numerous families; in short, having been not an inattentive spectator of what passes around me, I may venture as far as experience, not purchased at the cheapest market, will bear me out, and shall therefore take notice of one or two *novelties* of expence, the honour of which, I humbly presume, belongs exclusively to modern times.

The first I shall mention is a range of diseases which attack individuals, and indeed whole families residing in the metropolis, at certain stated periods, and which occasion those populous emigrations to Brighthelmstone, Margate, Ramsgate, &c. and other places, the growth and extent of which, within a very few years, prove my assertions geographically. These disorders take place from the month of June, and con-

tinue with a greater or less degree of virulence until November, when the winter's cold, fatal to all contagious fevers, puts a stop to these likewise, and enables the patients to return to town with safety.

The manner in which these disorders, or rather this epidemic sickness, affects the patient, I shall describe from the case of my own family. It begins with some degree of cough—particularly troublesome when *I* am present—shortness of breath—want of appetite (which, however, I must remark, is never so excessive as to diminish the weekly bills)—lowness of spirits, especially if the weather be very fine, a symptom I have never observed in any other disorder—inclination to cry—fretfulness, and uneasiness, what the faculty call *anxietas crica præcordia*. These symptoms increase as the season advances; and as the London physicians have found no remedy for it that can be taken *in town*, the cure must be looked for elsewhere.

This cure is termed a *jaunt*, a word which you will not find in any pharmacopœia, but which is in fact neither more nor less than a *strong draft*—upon my banker, to be taken in any convenient vehicle; and my family have generally found a post-chaise to answer the purpose extremely well, when taken every ten or twelve miles. As soon as the patient arrives at the place of final cure, all the disagreeable symptoms above-mentioned disappear; although in some cases I have known them recur at the end of five or six weeks, when they were again removed by another draft, as before said.

Now, sir, I much doubt whether these disorders

were known to our ancestors. Indeed, from no short memory, I have reason to think that they were equally economical in sickness as in health; and am confidently assured by very aged persons now living, that in their days a sober citizen would entertain no more sickness than he could afford; and that the medical practice of London was thought sufficient for every disease incident to that great city. The case, all must allow, is greatly altered; and every man, be his circumstances what they may, must now sit down in the sure and certain expectation that his family will be visited by the disorder of emigration. And, by the bye, this seems to contradict the commonly received opinion, that by alterations and improvements in building, widening streets, making sewers, &c. London is become more healthy. The very reverse, you perceive, is the fact. There are still three or four months left, during which the metropolis is not habitable with safety; and as this is attested every year by many thousand men, women, and children, we are bound to believe it, any thing to the contrary notwithstanding.

I should now proceed to a second head of modern expences, but as the above has taken up so much room, I shall postpone that to a future opportunity. I know that the subject is not an agreeable one, and that small doses will be preferable at first. In the mean time, I am, sir, your humble servant,

OLIVER OLDSTILE.

Correspondence with Dr. James Anderson of Madras.

INTRODUCTION.

DOCTOR JAMES ANDERSON of Madras, and the Editor of this work, having been born in the same village, and only differing in age by one year, were companions from their earliest infancy, schoolfellows of the same class during their whole progress there, and students at the same time, and nearly of the same classes, at the university of Edinburgh, have kept up an uninterrupted correspondence till the present day, which it is to be hoped will continue until one of them shall be permitted to withdraw from this theatre of existence.

Dr. Anderson (now of Asia) having chosen to follow the medical profession, went out to India, and about thirty-six years ago was appointed physician-general to the presidency of Madras, where he has resided ever since. His friend having chosen another line of business, their attention has been of course directed to objects of a different kind, though both have still continued to cultivate those dispositions which served at first to attach them to each other, and formed their principal pleasure in the early period of their lives.

Having adopted Asia for his country, Dr. Anderson, at a very early period of his residence there, applied the principal powers of those active energies of mind for which he is so eminently conspicuous, towards the meliorating the lot of a numerous class of men in that country, whose passive virtues could not fail to make

him respect national prejudices, which have been sometimes productive of severe distress to the innocent sufferers. He has seen, during the period of his residence in India, the country afflicted with famine several times; once in particular, when some millions of the natives actually perished for want, in consequence of inclemency of weather, which occasioned a deficiency of crop, the want of which they were not of themselves able to supply; and which put it in the power of others first to profit by their miseries, and then to suffer them to perish. Such ever will be the risk that the lower classes of every nation must run, when they suffer themselves to depend on foreign supplies for the absolute necessities of life!

Dr. Anderson, who never valued money but in as far as it might render himself independent of others for the comforts of life, and enable him to augment those of others, never once entertained an idea of accumulating wealth; and if he had, he has too much sense not to know that the giving of alms can afford but a limited and partial relief, and is liable to so many abuses, that, even while under the direction of the most enlightened beneficence, it will admit of doubt whether the evils to which it gives rise do not exceed the benefit it produces: but when it is under the direction of ignorance or caprice, or entrusted to the intervention of venal agency (which ever must be the case in a long course of time), it is undoubtedly the source of some of the greatest political disorders, and has a most powerful tendency to corrupt the morals of a people, and derange the internal economy of a state. On such a contaminating source of temporary

supply he never could rely for giving a permanent relief to a numerous people whose best interests he wished to promote, long after the period that he himself could expect to have any sort of influence upon any sublunary thing.

Most of the casts of the natives of India, it is well known, subsist solely upon rice and a few other kinds of vegetables, and would rather submit to perish a hundred times over, were it possible, than taste animal food of any kind. This deprives them of one powerful resource, which European nations enjoy, against the danger of famine, in consequence of a deficient crop; and as the crop of rice depends almost entirely upon the abundance of rain that falls in any one season, it necessarily follows, that when the quantity of rain is in any one year greatly short of the average quantity, the deficiency of crop is so great as to deprive the people at once of a great part of the food required for their necessary subsistence: and as the natives are there precluded from engaging in any kind of external trade upon their own account, they have it not in their power to relieve themselves, either by growing a much greater quantity than is required for their subsistence in ordinary years, and exporting the surplus, or by importing it from elsewhere in years of scarcity to supply their wants. From these considerations, Dr. Anderson, who wishes not to Quixotise, by attempting to correct arrangements of state which far exceed the power of his single arm to accomplish, has turned his attention towards the discovery of such means of relief as seem not to be totally beyond the power of a well-informed individual to accomplish.

With these views, considering that nothing which respects human institutions can be permanent if it be not grounded on the mutual convenience and interest of all the parties concerned, he bent his whole efforts to try to discover such means of improvement as appeared to him to have a direct tendency to effect these purposes. This subject, when closely investigated, naturally divided itself into two parts. The first was to discover such plants as were capable of affording wholesome food of a kind that the prejudices of the people did not induce them to reject; which could be reared without extraordinary moisture, and were thus adapted to afford abundant crops in dry seasons when the crops of rice fail. The second object was to discover such articles as might be produced or worked up by the lower classes of the people in general, without thwarting those religious prejudices which it is wise and politic to respect, and which, by being in request in European or other markets, might always insure a ready sale, and afford such a price as to enable the natives to find money to purchase food from abroad though even at a high price, when their own crops fail.

Having ruminated upon this subject for many years, and considered attentively in what manner such exertions as a private individual like himself was capable of making without disturbing the economy of the state, or of any individual, might prove most efficacious, he resolved to avail himself of that influence which his own personal character, and a long abode in that country, gave him among the numerous individuals from Europe, of his acquaintance, then residing in

India, to enable him to collect from them as much information as he could obtain, tending to forward the two great objects above-stated. With that view he opened a correspondence by letters with such gentlemen of his acquaintance as he thought would be most able or willing to forward his views; and by printing a numerous impression of such correspondence, from time to time, as circumstances might seem to require, and distributing these liberally among the Europeans in every part of India, thereby invite all who felt in themselves a desire to promote so laudable an end, to lend their aid in promoting it in the way that best accorded with their situations and circumstances.

Such were the circumstances that gave rise to that correspondence which I have now the honour of announcing to my readers. It is above twelve years since it commenced; and it now forms a series of not much fewer than twenty publications, none of which have ever been, or probably ever will be sold, but of which the editor has received a complete series from the beginning: the last two continuations, which bring down the correspondence from the 26th of May 1798, to the 9th of May 1799, having been brought by the Lord Mornington, just arrived from India (from which some extracts will be given in the present, and more in the future numbers of this work). At the commencement of his undertaking Dr. Anderson met with several disagreeable rubs, originating in the envy of individuals, and the jealousy of some of the inferior departments of government in India, which might have discouraged a man of less active benevolence, of inferior personal respectability, or of less independence

of mind than himself: but upon him they produced no other effect than that dignified firmness of conduct, and unresisting obedience to law, which is natural to a superior mind. This conduct produced its natural effects, by commanding the unequivocal approbation of every unprejudiced person in India. The governors of Madras in particular, all of whom, unless it was Holland, (who held that office for only a short time, with little honour to himself, or benefit to others) have been inclined most cordially from the beginning to forward his views; he also obtained the most decided support of the Court of Directors at home, in consequence of whose orders all the disagreeable bars that were occasionally thrown in his way have been entirely removed for several years back, and the governors have been at liberty to indulge their inclination, by lending every aid to his exertions that their situation permits, and sound policy demands. In consequence of these agreeable changes, the correspondence becomes more and more interesting, in proportion as the exertions of individuals thus favoured by the different departments of government, become more efficacious. Things are now in such a train, if his life shall be spared, and health continued for a sufficient length of time, as promises to bring to light a greater number of useful facts respecting the native productions of India, than was ever known in any other nation, and to disseminate them more universally than has ever before been known: for his correspondence reaches over the whole surface of India, as far as Europeans are to be found, as well as to the Cape of Good Hope and St. Helena, (these

two last settlements being employed as most convenient stages for depositing plants to nurse in their progress to or from more distant regions,) the West Indies, and South and North America: nor is even Otaheite itself beyond the range of this extensive influence, of the nature of which the readers will be better able to judge by the subsequent communications. It may be proper to add, that the Editor, in consequence of the kind interposition of Dr. Anderson, and his nephew Dr. Berry, who is his most zealous coadjutor in so good a work, will be enabled to obtain from thence, as soon as a return can be made after his work reaches India, correct drawings of many valuable, curious, and rare articles in natural-history, which the ardour of the doctor's correspondents in India induce them to send to him in abundance, and which his situation does not permit him to get published there, but which will have all the justice done to them in this work, that its nature will admit.

The objects upon which this correspondence has hitherto principally turned, are too numerous to be all of them displayed in this abstract. It will be enough here barely to announce a few of the most important of these, beginning our enlarged extracts only near the present time. The principal object on which this correspondence turned at the beginning, was the rearing the cochineal insect; with which view great exertions were made to obtain the proper kind of *opuntia* or *cactus*, as it has been differently called, to serve as the proper food for the real cochineal insect, in case it could be obtained from South America. This last attempt has not as yet been attended with success.

But there are now in India such a variety of the class of plants above named, as leaves little room to doubt that whenever the insect shall be carried to India, it will there find the plant which is proper for it. One insect of the *coccus* tribe was indeed brought to India from Buenos Ayres, by the great care and spirited exertions of captain Nelson, which at one time gave hopes that they had succeeded in this enterprise; but upon trial it proved to be nothing else than that variety which is called *sylvestre*, and which affords a dye of such a weak quality, as to render it not worth rearing: we must therefore wait with patience till an opportunity occurs of bringing the true sort. In the mean while plants for sustaining it have been sent to the Cape, St. Helena, and every sea port belonging to Britain in India; so that there is little chance of its being lost for want of food wherever it shall be landed. In consequence of these experiments it has been discovered in the mean while that the succulent leaves of the *cactus mitis*, which is supposed to be the genuine *cactus cochinifer*, is, when boiled, much of the same nature with European greens, being a very palatable food for man; and in its raw state is readily eaten by most kinds of domestic animals, to whom it proves a very wholesome food.

The introducing the silk-worm from China (which affords the finest silk hitherto known) into Bengal, and the other British provinces in India, occupied a considerable share of the public attention towards the commencement of this correspondence, in consequence of which numerous plantations of mulberries were made; and the people every where instructed in

the manner of rearing the silk worms, and winding the silk. It is now several years since the first specimens of silk of this manufacture were sent to Europe, which having been approved of by the best judges, the culture of it is now established there, and rapidly increasing from year to year.

The culture of indigo has also by the same means been of late introduced into those provinces, and there is every prospect that it will soon become a staple manufacture of that country.

And latterly a variety of the cotton plant, of a peculiar degree of fineness, has been introduced from the Islands of Bourbon and Mauritius, the culture of which is rapidly extending every where, as we shall have occasion farther to specify in some succeeding articles.

While these great works, intended to form a basis for trade and manufactures, were going on, a vast variety of trees and plants, and fruits, useful as food to man or beast, or beneficial in other respects, have been discovered in places where they were not known to exist, and diffused in all such places as they have the appearance of being useful. Among these is the bread-fruit tree, which has been lately found in the peninsula of India; several sorts of palms that afford sago and other useful products; with a multiplicity of others of great utility, whose names are not familiarized as yet to European ears. Of late, the spice trees from Amboyna, and other Dutch settlements, have become a very important object of cultivation, which we shall soon have occasion more fully to specify.

These slight notices will, it is hoped, prove sufficient to enable the reader to peruse with intelligence the letters that follow, which are selected from that correspondence, and will be continued from time to time.

To James Anderson, Esq. M. D. &c.

DEAR SIR,

Castle of Good Hope, Oct. 11, 1798.

I AM sure you would think any apology unnecessary for a stranger to make in addressing a line to you, at the desire of the Earl of Macartney, who had nothing particular at present to write about himself, only to express his best thanks for your obliging attention to his wishes with regard to the cotton seed which came safe to hand. His Excellency, who, like yourself, has always made public utility his great pursuit, has lately, with this view, appropriated a part of the public garden at the Cape for the reception and culture of foreign plants, particularly of such as may appear most likely to prove of reciprocal benefit to the mother country and to the colony; and he has done me the honour to place this part of the garden under my superintendence.

Among the many foreign articles, that should seem to be cultivated here with success, none bids fairer than the cotton plant. The specimens of the wool produced from some partial trials, were so fine as to induce his Excellency to encourage the culture of it. But unluckily the intention has been frustrated this year by the bad condition in which the seed you were

so good to forward, arrived, owing probably to its age, or from being overheated in the ship's hold. On a rood of ground I have not been able to obtain more than a dozen plants. To distribute such among the farmers would raise at once a prejudice against it, and deter them from making future experiments. I shall therefore wait the arrival of a second bag of seed, which you mention to his Excellency to be your intention to send; perhaps small quantities in separate bags might be transported with less injury to the seed. The palmira, the date palm, and the areca nut, I imagine, would thrive here; if you would have the goodness to send us a few plants of these, or any other curious or useful plants that you may judge likely to succeed, you will do the colony a great service.

You will receive from the ship that brings this, under the care of major general Baird, who has been good enough to take charge of them, a square box with young oaks, in which are also planted a few seeds of the silver protea. The same species of moth that produces the Tufsach silk of India, feeds here upon this plant. The two varieties of the myrica cerifera I will endeavour to procure, and to send with the earliest opportunity.

JOHN BARROW.

P. S. To give you an idea of the nature and intention of the establishment of a botanic garden at the Cape, I take the liberty of enclosing an abstract of the governor's instructions.

Extract from the general instructions of the Earl of Macartney, Governor, &c. to John Barrow, Esq. as superintendant of the botanic garden at the Cape of Good Hope.

ONE of the first objects of this institution is the reciprocal benefits that the mother country and the colony may hereafter derive by the introduction of such plants into the latter as produce articles of general consumption, &c. &c.

You will therefore, without loss of time, enclose the space appropriated for this purpose with a quick fence, and divide it into three distinct parts.

The first division you will appropriate entirely to the reception of such plants from Europe as may appear most likely to prove beneficial to the colony. A nursery, for instance, of the different forest trees, will occupy a considerable part of this division; the artificial grasses will take up another part; fruits, and culinary vegetables, not yet introduced, will employ the rest.

The second division you will set apart for the reception of such of the African plants as are least known in Europe, and such as may be esteemed in the colony for their medicinal qualities. The botanist and the experimentalist who may not have either leisure or the means of travelling over the wilds of Southern Africa, may by these means meet with the object of his researches near at hand. The gardens of Europe may in time be supplied from hence with many curious plants, which at present are not to be procured, even by those who have long been resident upon the spot.

The third division you will occupy by Asiatic and American plants. You will try with what success the different fruits of India and China may be cultivated at the Cape, whether sugar canes, tea, coffee, cotton, indigo, and many others, will grow to advantage in this climate, as well as such flowering shrubs and herbaceous plants as may be esteemed for their beauty, rarity, or singularity.

To John Barrow, Esq. superintendant of the botanical garden at the Cape of Good Hope.

DEAR SIR,

Fort St. George, Jan. 8, 1799.

THE Sceptre and convoy having arrived safe here the night before last, I have been favoured with the receipt of your letter and its enclosure; and although there has not yet been an opportunity of getting the plants on shore, I have learned that they are alive and healthy: but, lest you should hereafter be surprised by my printing an answer to your letter at a time when no chance of my sending it to the Cape presents itself, I must observe that the views of lord Macartney, expressed in his instructions to you, can be but partially supported without public communication.

It is true that I can, and will with great pleasure, supply those seeds and plants you have mentioned, and many others, when opportunity offers; but there are some articles, particularly the tea plant, which, by private communication, we have hitherto failed to obtain; I have therefore thought proper to cause the plan of your institution to be inserted in our public prints

without loss of time, in hopes of thereby exciting the attention and zeal of persons with whom we are not in immediate correspondence.

Wishing every success to your endeavour in supporting his Excellency's patriotic institution, I am, &c.

JAMES ANDERSON.

To John Barrow, Esq. Cape of Good Hope.

DEAR SIR,

Fort St. George, Feb. 5, 1799.

ALTHOUGH I am satisfied, that as you have raised a dozen plants from the seeds first sent, they will prove sufficient, in no great length of time, to supply every planter at the Cape; yet, that you may with confidence begin to extend the cultivation of cotton immediately, my friend, Mr. William Webb, has been so good as to select sixty pounds of fresh seed, and as it is a kind of weavel (a species of dermestes) that chiefly proves destructive to the cotton seed, I have likewise caused my servants carefully to pick out to the amount of eighteen pounds from the seeds of last crop.

Mr. Roebuck, who has carried the cultivation of indigo to the greatest extent of any person here, has put up a small quantity of that seed, for trial in your garden, and in support of an idea of Dr. Roxburgh, my nephew, Dr. Berry, has collected some seeds of the convolvulus *pes capræ*, to be sown on the sand hills, with a view to fix the sand about Saldahna Bay. To those I have added, seeds of hibiscus, cannabis, and crotalaria, in hopes of thereby contributing to a

marine supply for cordage, which being an object of the first consequence, will induce you to give them a chance of cultivation in Southern Africa.

Colonel Orr, whom ill health obliges to leave this climate, has been so good as to take all those seeds with him on board the ship Cornwallis, and will occasionally have them aired on deck during the passage at sea.

Captain Dunlop having been so obliging as to favour me with the passage of some plants on the Triton, agreeable to your desire, I have sent some of the Arabian date, the palmira and areca of this coast, which will be taken care of, and delivered to you by Mr. Maxwell Thompson, who goes surgeon with the French prisoners on that ship, with directions to water them once a week in dry weather.

JAMES ANDERSON.

*To John Barrow, Esq. or the superintendant of the
botanical garden, Cape of Good Hope.*

DEAR SIR,

Fort St. George, Feb. 16, 1799.

BESIDES a quantity of cotton seed, equal to that sent on the ship Cornwallis, I now forward by Mr. Johnston, who is about to take his passage on the Princess of Wales, a duplicate of the other seeds sent on the Cornwallis, with the addition of seeds of the *asclepias gigantea*; and, in proof of the laudable emulation excited by your endeavours, Mr. Woolf, who has a considerable plantation of Mauritius cotton in this neighbourhood, likewise sends

one hundred weight of that article, carefully selected for seed from the last crop.

I understand that a species of aloe grows at the Cape which is deemed to be the same as that manufacturing here into cables and cordage; yet, as the variety in species shew much difference of quality in some genera of plants, that you may possess this identical kind, which is probably the same as that which yields a revenue to government in Mexico, I have sent some of them, together with plants of the *aletris hyacinthoides*, of which bow-strings and fishing-nets are frequently made here. Both these plants require a dry soil, and will only thrive on banks and ridges of earth, where water cannot lodge.

It may be proper to observe, that we have hitherto obtained no account of the material which is manufactured into tiller rope in China, nor the natural history of the best material for fishing lines, commonly called China grafs, nor the gauze worn as a dress or covering by the Malays, nor the ravinsara of Madagascar, nor the cloth made by the women of the Sandwich Islands of the rind of a tree, although they are all very strong and durable substances; but I have thought it consistent with your plan, to enumerate these as subjects of research and experiment in a botanical garden, relying on your being supplied from England with the seeds of hemp and flax, the cultivation of which may be extended with greater confidence, as better known, and hitherto more extensively employed.

Mr. Johnston has likewise been so good as to take charge of two engrafted Alphonso mango trees, the

fruit of which is esteemed by many Europeans the most delicious of any in Hindostan; and, as it is but few trees or plants that can be conveniently sent by sea conveyance, I have only troubled him farther with three kinds of cocoa nuts, twenty of each kind, viz. the royal, the Nicobar, and the cocoa of this coast. They should be laid close to each other on a bed of garden mould, covered with sand, and watered so as to keep the sand moist; in two or three months the corculum will break through the shell, and when it puts out two leaves, they may be taken up and planted where they are to stand in the open ground; here we plant them low, as to admit their being occasionally watered in dry weather.

Abundance of date, palmira, and areca seeds, shall be sent when the season of their ripening arrives, which will prove a better method of supplying you than any mode of conveying plants of these trees, as the seeds of palms retain vegetative power a considerable space of time, and I have no doubt will thrive at the Cape, which is in the same latitude south, as the city of Zenobia is north; nor are the limits of the growth of palms on either side of the equator determined.

The enclosed gazettes will shew how punctually I have published the communication of your institution, that gentlemen resident at any of the presidencies might forward such tropical productions as they wished to be tried in a higher latitude.

JAMES ANDERSON.

Extracts from a manuscript Account of the Loss of the Winterton East Indiaman upon the coast of Madagascar in August 1792.

[Continued from page 147.]

CHARACTER OF THE INHABITANTS.

“THOUGH they be certainly one or two steps above a state of barbarism, yet the traits of a savage people may be still discovered; and, though during our stay on the island we were treated in a manner that would have done honour to a civilized nation, yet we were entirely indebted for so good a reception to the king, and a few of the head men. But considering the many instances of cruelty we daily see in countries that enjoy advantages to which the inhabitants of Madagascar are totally strangers, we must certainly conclude that they are a good and humane people. The natural humanity of their disposition may be plainly perceived in their behaviour to each other. Nothing is more rare there than private quarrels; the greatest harmony reigns amongst them. They never get any thing without sharing it with some of their neighbours. They have slaves, it is true, but they treat them almost as their own children, never beating them, nor using them otherwise harshly. In all this they are a model well worthy of imitation.

“ In a country where nature has done little, and art still less, fertility cannot be expected; accordingly there grows no where almost any thing of use, excepting in the confined plantations belonging to the

principal people; which produce sweet potatoes, rice, Indian corn, callivances, pumpkins, bananoes (that the natives use chiefly unripe, roasting and boiling them), and sugar cane; but all their productions together are little more than just enough to support their owners; yet these may be said to be all that the islanders have to depend upon. The kings and chiefs of the different villages give, it is true, from time to time a bullock to their people; however that is but a precarious means of subsistence. Huts built with rushes, from about thirteen to fifteen feet in length, with a fire-place in the middle, serve them for an abode. Their furniture consists in a bed made of reeds, covered with a single mat, a few calabashes, some wooden spoons, and two or three earthen pots, which they pack up and remove from one place to another at a moment's warning. But, in spite of these disadvantages attending their food and accommodation, they are social and happy. They generally end the day with supper, which is their chief meal. They then sit down and converse at the doors of their huts. They have, too, a game which they play at with the nut of some tree, and which seems to require much attention.

“The Madagascar men have a great desire to acquire information, and also, in general, a quick comprehension. They show great ingenuity in making their lances and their different ornaments, which they accomplish by means of hammers and other small tools that they have got from ships; they show, too, surprising dexterity in weaving the cloth they wear about them. On the east coast, they make cloth of a

sort of rank grafts so very fine, that it would rival the productions of many European manufacturies. Some of the natives can make themselves be pretty well understood in English. There is one of the governors in particular who is uncommonly acute, and who has something in his appearance singularly engaging. He made deep inquiry into many things; especially into the nature of our religion. If it were possible to convey him to England, there is no doubt but he would profit much from the many things he would there see and hear; and that he would be well able to communicate his knowledge to his countrymen. But whether by this increase of their knowledge their real happiness would not be diminished, seems very doubtful. They love their king almost to adoration, which shows the effect of custom on a people as well as on individuals, for he is addicted beyond all bounds to drinking. Indeed they may be somewhat blinded as to that vice in their king, being themselves to a man drunkards. [Their drink is a spirit made of sugar cane, tamarinds, and honey, which is pretty strong, but the smell of it alone is enough to make any person that is not accustomed to it sick.] But again, it is to be wondered at that no attempts in their fits of drunkenness are ever made against an arbitrary prince, particularly one so young as he is (he is about twenty-three or twenty-four years of age), which is certainly the consequence of an inherent respect. Though very submissive to their king, they are naturally proud and high-minded. Though easily pacified, they are passionate to a great degree, and eager to take vengeance on those who have offended them. Of this we had a strong instance

a short time after our arrival. Some of our people having taken from the hut of one of the natives, in his absence, a considerable quantity of gunpowder, they were called out by the officers of the ship to be warned of the danger attending such practices; when thus employed, we were alarmed with dreadful hooping and yellowing, and suddenly about a thousand blacks rushed from among the bushes, armed with muskets and lances, and came running towards us with the intention of putting us to death; which they certainly would have done had not the king hurried out with his guards and got before them just in time to save us. By his intercession the matter was made up, upon promise being given that no such thing should again happen. The gunpowder was restored, and the natives departed.

“There is one almost universally prevailing vice among the Madagascar men, viz. that of stealing; and it is astonishing with what dexterity they accomplish their ends. They used frequently, unheard, to open the doors of our tents, and carry off the cloths with which we were covered. They used also to cut holes in the rushes, and draw our clothes from below our heads; and, though the grandees went about it most secretly, still it was no uncommon thing to be robbed by a prince, or a duke. But this vice extended no further than to us; for among themselves there is not an honester people in the world than they are: and all the time we were on the island, there was scarce an instance of one native stealing from another. If any thing can apologise for their stealing from us, it is certainly our having been possessed of things to which

they were strangers, and which appeared to them inestimable.

CHARACTER OF THE KING.

“As to the character of their king as an individual, there is surely something great in his ideas of justice. The night of our arrival, some of the party having offered him a present that they had brought along with them; “Keep it,” says he (by the black who always acted as our interpreter); if your ship had not been wrecked, I could have accepted of it, but since it is otherwise, I will take care of you for nothing.” Another time one of the sailors having abused a native, he was about to be punished, when the king came and took him away, saying, that he was certain that, supposing any of his people were to be wrecked in England, our king would not allow them to be punished, and that therefore our crimes should pass with impunity. We cannot express in too grateful terms the great goodness and self-denial he showed, in remaining constantly by us, in spite of the strong desire he had to go to another village about fifty miles off. We were several times in great apprehension on that account; and one evening in particular, when he came and told us that he meant to set off the day following, and desired that we should determine whether we would go along with him, or go to St. Augustine’s Bay, adding, that if we remained we certainly would be cut off by robbers, who, he said, some times infested that place. In the sickly state in which we were, either of the alternatives would have proved fatal to most of us; we therefore represented to him our situation in as strong terms as possible. He was made

sensible of it, and said, that he was indeed very anxious to go, but that on our account he would remain; which he did to the last. Though he no doubt looked for a reward for what he did, yet the prospect of that was so distant and so uncertain, that his generous conduct towards us must have, in a great measure, proceeded from a real generosity of disposition, and a truly good heart. He at first absolutely loaded us with presents of bullocks; and, though he relaxed in his goodness in that respect, yet that was not at all to be wondered at, when we consider that the bullocks he gave us were given to us instead of his own soldiers, which of course occasioned much complaint among them, and which was the chief cause of their being our so great enemies; however he continued always to make us from time to time presents of them. Besides, he furnished us with the means of supporting ourselves without his assistance, by a liberal distribution of dollars, of which we shall here give some account.

“The fishermen having gone off to the wreck at low water, had, by diving, recovered the greatest part of the dollars. As it is customary, I believe, when any thing of value is found to give a part to the king, on the sixteenth of September a great number of the fishermen came up to his village, bringing a very considerable present. The king, attended by some hundreds of his soldiers, went out to meet them. After much ceremony, accompanied by dancing and firing of muskets, the money was delivered over; when he immediately ordered about twenty-two thousand dollars to be given to our officers, for the purpose of being afterwards divided among us. The money was ac-

cordingly placed in an open plain; but, before an equal division could take place, our sailors and soldiers begun to seize it forcibly. The officers, thinking it might be proper to make an effort to save it for the East India Company, applied to the king for assistance. He replied, that the dollars were then his, and not the Company's, and that he considered those he gave us as a free gift from himself. But said that, as it was his desire that the gentlemen should have more than the people, he would comply with their request, and accordingly sent a party of his soldiers to retake possession: but before his purpose could be effected, our people had carried off a considerable number of them. The day following the king summoned us together at sun-rise, and distributed among each class so many bags of dollars: to the soldiers he gave at the rate of eighty-three dollars each, to the sailors one hundred and fifteen, and to the gentlemen hundred and fifty-one each; he gave the ladies a bag, containing six hundred in all, and to the second mate and purser two bags of nine hundred each; he also gave six hundred dollars to be divided between two of the people who could play upon the flute, of which instrument he was extremely fond. Though the natives who supplied us with milk, rice, &c. in spite of all the regulations made by the king, immediately raised the price of the different articles to an exorbitant height, [the price of milk was at first a dollar for about a pint, and rice and every other article proportionably dear; but the money becoming scarce, they afterwards become much cheaper]; there is no doubt but if the people had been prudent, and had not squandered away their

money in the foolish manner they did, they would not have been reduced to the sad state they afterwards were from the want of it. This wonderful trait of generosity in the king excites our admiration the more, when we consider that he disposed of a commodity to which he and his countrymen had been till then almost entirely strangers: a commodity which they prize more than any thing on earth, and which they even expect will be their reward in Heaven. It is to be hoped that he will meet with a recompense; for surely goodness never merited it better. A very trifling sum, properly laid out, would make a handsome present to him and to two or three of his chiefs. Political views themselves might be a sufficient motive for making a return; as we may rest assured that, if it ever happens that another English ship is unfortunately wrecked, either near St. Augustine's Bay, or on either part of Madagascar, the treatment of the crew will entirely depend upon our gratitude on this occasion."

[*To be concluded in our next.*]

Dr. Cullen's Lectures on Agriculture.

The Editor of this work hopes it will not be deemed an unpardonable impertinence in him to draw the public attention to the circumstance which gave rise to the following short correspondence. He can scarcely form an idea of a crime that is, in his eyes, of a more atrocious nature than an attempt to murder the reputation of a man of great worth and high attainments, by publishing after his death writings which are held out to the world as his genuine performances, although they are known to be spurious. This is attempted to be done in the present instance with regard to a man to whom the Editor lies under such obligations, as that he would ac-

count it an unpardonable crime in him not to use every effort in his power to prevent such a species of assassination. He therefore takes this earliest opportunity that presents itself of warning the public concerning it, and can scarcely doubt but that, in conjunction with the representatives of Dr. Cullen, he shall be enabled to give an effectual check to this injurious procedure, should the parties concerned proceed in their declared resolution.

[COPY.] *Letter to Mr. V. Griffiths, Bookseller,
Paternoster-row, London.*

SIR, *Isleworth, Nov. 6, 1799.*

AN advertisement has been just pointed out to me on the cover of the third number of your Commercial, Agricultural, and Manufacturers Magazine, in which you give notice, that "by the obliging attention of Arthur Bruce, Esq. of Edinburgh, you have obtained a copy of an abstract of a course of lectures on agriculture by the late illustrious Dr. Cullen of Edinburgh," and you promise the first part of that abstract in your next.

I take this method of informing you, that I had the honour of being one of the few persons (fourteen only in all) who attended that course of lectures in the year 1758, and that no notes are known to be preserved of these lectures but those that were taken by myself. These were carefully preserved by me, because I considered that it would not only have been a breach of trust in me to have disclosed them (these lectures having been delivered in private only to a few friends, under injunctions, and in full confidence that they should not be published); but also that, considering the very imperfect manner in which these notes were

taken by me while as yet a boy, and unacquainted with the very names of many of the most common things, it would have tended much to degrade the character of Dr. Cullen to have had such imperfect notes circulated as the genuine performance of that truly great man. Yet, having shewed these *once, in confidence*, and under the strictest promise of secrecy, to Dr. Cullen's own son, while the doctor himself was yet in life, it now appears that an unfaithful amanuensis of Dr. Cullen, who had access to all his son's repositories, had *surreptitiously* obtained a copy of them, which he sold to sir John Sinclair, who improperly and very unadvisedly printed them in one of those papers that were privately circulated (but not sold) by the Board of Agriculture. This no sooner reached my knowledge than I advised sir John Sinclair of the above particulars, and protested against these notes being published, as being an infringement of my property in them; and intimating, that, for the reasons above stated, I hoped the Board would abstain from publishing them, and thus prevent me from being reduced to the disagreeable necessity of resorting to other means of obtaining protection. An advertisement to that effect was then put into the newspapers (a copy of which you will find annexed to one of the volumes of the fourth edition of *Essays on Agriculture, &c.* printed by Davison, London, and sold by the Robinsons), to which I refer. Now, Sir, as I can have no doubt but the paper to which you allude is a transcript of these notes, that has been obtained either from the unfaithful amanuensis above alluded to, or, what is more likely, from the printed paper above specified,

I hereby give you notice, that if it shall prove to be so, and you shall proceed to print and publish it, you must do it at your peril; for while I live I shall not, if it be possible to prevent it, permit these my notes ever to be published as the performance of Dr. Cullen; because this must prove so infinitely derogatory to the character of a man whose memory I shall ever hold in the highest veneration. The Board of Agriculture, on account of my representation, conscious, no doubt, of the injury they would thus do to a much respected character, have desisted from their intended publication of it; and I can scarcely entertain a doubt but you will do so likewise: but should it be otherwise, you must forgive me if I shall then have recourse to the law in support of my just rights; which, I beg leave to assure you, I never should do were my own pecuniary advantage alone to be at stake. I shall expect your answer, and am, Sir, your most humble servant,

JAMES ANDERSON, LL. D.

Author of Essays relating to Agriculture and
Rural Affairs, &c. &c.

P. S. If you think it necessary to apologise to your readers for omitting the article, you have my full permission to publish the above.

The following answer was received.

To Dr. James Anderson, Isleworth.

Dr. ANDERSON is respectfully informed, that the publisher of the Commercial, &c. Magazine, knows, from a comparison of the two articles, the abstract

which he promises of Cullen's Lectures, &c. to differ in all but derivation from the same source, from the abstract made by Dr. Anderson, and that, whatever the world may think, no composition of Dr. Anderson's will ever, in the opinion of the gentlemen concerned in the Commercial Magazine, deserve publication in their work.

N. B. *A copy of the above letter was transmitted to Mr. Bruce at Edinburgh, at the date it bears, that he might not be inadvertently brought into a scrape. From him no answer has been received at this time, November 20th.*

Index Indicatorius.

THE favour from a respected correspondent from Sunderland (with many others) has been received, and the acknowledgment delayed too long. The Editor is too sensible of his own deficiencies, to think of undertaking what this correspondents partiality makes him think he could so easily accomplish. He will do the best he can to prepare materials for others to build up a *complete body of agriculture*: but to attempt such a building with the materials now known to us, would indicate that the person who undertook to do it, either knew not himself the insufficiency of the materials which he would be obliged to employ, or regarded not the danger to which he would thus subject those who were to pay for it. He will endeavour to follow the hints suggested by this friendly correspondent as far as he can. The remarks he pro-

mises will be welcome, and have all justice done to them.

It is very doubtful whether the communication signed *T.* be meant seriously or ironically. It is a proposal for making green hay, during a rainy season, by the aid of a kiln. If it be intended as a joke, it is of too trifling a nature to be of any consequence. If the writer be serious, he is desired to consult the last page of our last number.

H. G. H. among other particulars mentions that he has found grafts for fruit-trees that were taken off in the beginning of winter, and stuck into the ground, have succeeded much better than those that were cut off soon before they were used. This practice has been recommended by many writers, but it is perhaps too much neglected. In answer to his query respecting the best stocks for dwarf fruit-trees, the pure paradise stock is the best for apples. These stocks are obtained as suckers from paradise stocks, which they send up in abundance. The quince is the best dwarf stock for pears. Trees grafted on these stocks never attain the size of others, but they begin to bear much sooner; and, in general, carry more fruit than those on free stocks. So that by planting a greater number of trees on the same space of ground, as much fruit may be obtained from it in five years, as could be gained from it if planted with free stocks at their full distance in twenty years. The black-thorn, or sloe-tree, may be employed as a dwarf stock for plums, &c. But I know no proper dwarf stock for cherries, though it is probable that plants raised from the seeds of the morello cherry might answer that purpose; or

still better, the pendent, or weeping cherry, lately introduced as a curiosity, for its shoots are extremely dwarfish. Mr. Forsyth's ointment for trees consists of cow-dung, wood-ashes, bone-ashes, and fine sand. Proportions about two parts recent cow dung, one part wood-ashes, one ditto bone-ashes, and very fine sand; mix the whole with water to the consistence of oil paint, and lay it on with a soft brush. If bone-ashes be not at hand, wood-ashes may be wholly employed in its stead. If it be a large wound, be careful to lay it on equally and to a good thickness; and when it is grown so dry as to be firm, though still soft, throw some bone-ashes in powder upon it from a tin box with holes in its cover like a dredge-box, and when well covered, pat it gently with the palm of the hand (or the side of the brush) to make the powder sink into the half-dried matter. In some future number I shall give a more particular account of it.

The extract which *A. B.* has taken the trouble to transcribe from a Dutch journal concerning the transmutation of oats into rye, affords one of the numerous instances that daily occur of the evil consequences that result from inaccurate experiments. A countryman having sown oats and cut them green three times during that season, in the ensuing spring only a few stalks set out any fresh shoots, and these were good rye. Oats then were converted into rye; nothing was more natural. In Sweden, where rye is a common grain, it frequently happens that some grains of rye will be mixed among the oats; these spring up with the oats, and by being prevented from shooting during that season, continue in a state of

vegetation longer than they naturally would have done. And as rye stands the winter frost, which oats cannot do, the oats are all killed, and the rye alone springs up the ensuing season. The experiment might *thus* be repeated a hundred times over without ever failing. I know nothing that has tended so much to retard the progress of agriculture, because nothing makes error assume so much the semblance of truth, as experiments inaccurately conducted. What a bonfire it would make if all the books which record such experiments were burnt at once!

The Editor feels himself under great obligations to *Arta* for the favour of his second essay, and regrets that the plan of his work forbids him to avail himself, for the present, of that kindness. He ought never to forget the title and principal object of his work, which is *Recreations*, and of course studies which might be too deep for the class of readers for whom this work is chiefly intended, must be sparingly admitted. For the purpose of illustrating phenomena, especially when they respect useful practices, some of those physical laws on which they depend may be explained in a popular way, so as to render the matter clear to such as choose it; but the way must be prepared by means of many lesser steps before we shall dare venture on deep physical illustrations, merely as such.

Cives, after mentioning this work in terms of the most obliging partiality, too flattering for the Editor to be here inserted, recommends that one sheet more should be added to each number, to be sold at an additional price, or that the pamphlet should be pub-

lished twice a month. The Editor is desirous of meeting the wish of his readers in general, in as far as it is in his power; but he is averse to alterations, unless where he shall see reason to think they will prove agreeable to the greater part of his readers. When one goes steadily forward on the same plan, none have reason to say they have been misled by false views being held out to them; and this consideration will ever have its due weight with those who wish to adhere to the golden rule, of doing to others as they would wish that others should do to them. It may not however be improper here merely to mention, that as this work was not undertaken with a principal view to profit farther than complete indemnification, the expences were calculated at the prices current at the time of its commencement. Since that time the price of paper has advanced full *twenty per cent.* and it is confidently asserted that an additional rise of fifteen (some say thirty) *per cent.* on that article, will soon take place. Should this be the case, some alteration, with a view to counteract this, will doubtless become necessary; and till it be seen how this matter shall go no alteration will be adopted.

The communication from *Albinus* came too late for this number; as also those from *Trueman*; *A. Z. Y. Fidelis*; *A true Friend*; *Cuckniensis*, and some others.

N. B. There is no probability that any paper which is not received before the 10th of the month will ever be in time for the current number.

RECREATIONS, &c.

N^o 10.

AGRICULTURE.

Hints respecting the circumstances that require to be chiefly adverted to in experimental agriculture, particularly with a view to a proposal for instituting a national experimental farm.

ON THE VARIETIES OF THE SHEEP KIND.

[Continued from page 175.]

DIFFERENT varieties of animals are not only distinguished from each other by a propensity to fatten more or less easily, but also by many other peculiarities that may render them useful to man. Perhaps the variety of dogs that can be the most easily and the most quickly fattened is the king Charles's spaniel, many of which can be brought, in a short time, to be one lifeless lump of fat, almost incapable of movement. The greyhound is, on the other hand, the most difficult to be fattened of all the dog tribe known in this country. Perhaps no management that could be adopted ever could bring the flesh of the greyhound to be either so fat or so flabby as that of this kind of spaniel. Is there not reason to believe that the flesh

of these two varieties would be extremely different in flavour and other respects if they were to be eaten? The one might prove too hard, the other too flabby; the one too high flavoured, the other too insipid. Might it not be possible so to blend these qualities in a mongrel breed as to approach more or less to the one or the other, than either of the breeds in their original purity would be?

The differences between the *taste* and other peculiarities affecting the flesh of the varieties of animals of the same species, does not seem as yet to have obtained the attention it deserves. In some animals nature discovers a perpetual tendency to separate the fat from the lean, and to exhibit them totally distinct from each other. This is peculiarly the case with the whale; in which the fat lies on the outside of the body to a great depth, while the red flesh within is said to be a hard, dry, juiceless substance. A conformation somewhat of the same sort, but in a lesser degree, takes place in the sow; whereas, in the other domestic animals we use for food, the fat is more generally blended with the lean, and it is of course more juicy and palatable. That a diversity in this respect takes place in different varieties of the same species, there seems good reason to believe. In the common goose there is a strong tendency to throw out fat on the outside, which renders the flesh of that variety of geese much less palatable, and worse to digest than that of the small Orkney goose, on the outside of which there is no fat; that substance being blended every where through the flesh in the form, while hot, of soft juice, like that of well ripened mutton.

The favourite breed of sheep of the present day has a tendency to generate *unmixed* fat on the outside, like the whale, in an extraordinary degree. For some purposes this quality may doubtless be very desirable; but it seems to be by no means clear, that this will not disqualify it, in a great degree, for many other purposes: nor is it by any means proved that another breed may not be found, which shall have an equal tendency to generate fat that shall not be exhibited so much in a separate form, but be more intimately mixed and blended with the flesh. Every one knows, that the difference between the juicy beef of a well-fed Kiloe (Scots highland) ox, and that of some kinds of large stall-fed beeves, in point of flavour and delicacy, is immense. Whether the superior flavour of Welsh mutton, so universally admitted as undeniable by all who know it, be owing to the influence of breed, or of other circumstances, is not yet known; because the subject has never undergone a serious investigation. But as there can be no doubt that the hardness of the animal, its propensity to bear fine or coarse wool, to produce a thick or a thin, a long or a short fleece, and many other peculiarities, are occasioned by a difference in blood rather than local circumstances; why may not this be the case with regard to the flavour also?

The South-down mutton is very generally allowed to be much superior in point of delicacy and flavour to the Leicester, and most other breeds of sheep in the southern parts of this island; and a general opinion also prevails, that the original small breeds of sheep in Scotland afford more delicate mutton than the

larger, and, as they are commonly called, *improved* breed of sheep from England; but no experiments have yet been made, with the requisite degree of accuracy, to ascertain these points, which some think are doubtful.

That there are breeds of sheep which yield flesh on some parts of their body, at least, which is extremely different in its qualities from any thing that is afforded by other breeds of sheep, is a most undeniable fact. There is no meat to be found on the body of our common breeds of European sheep, which, in many of its distinguishing characteristics, resembles that of the tail of the broad-tailed sheep of the southern parts of Africa and Asia; far less does any part of the flesh of our mutton bear the smallest similitude to that of the hemispherical bumps on the buttocks of the *Steatopyga* breed, which so much abounds in the northern parts of Asia. These bumps are called fat, because they resemble that substance in colour and consistence more than the lean of mutton; but it differs extremely from the fat that is found on any part of the body of our sheep. Since, then, there are some varieties of sheep which evidently bear meat of quite a different kind on some parts of their body from any that is to be found on the body of other varieties, why may not a similar diversity, originating from the same cause, take place between other breeds respecting the production of other substances, which may be found in some, though totally wanting in others? Or, why may not some varieties be naturally disposed to generate in greater proportion or in greater perfection certain other substances that are common to most of the

varieties? We certainly depart not from the strictest analogical reasoning when we should infer that this may be the case.

It is thus we may be induced to suspect that there may be breeds which will be naturally disposed to generate a much greater proportion of tallow than others, though fed and managed in the same way. But we in vain look for the experiments which can point out to the attentive farmer, with the requisite degree of certainty, which are the breeds that are most distinguishable in regard to this particular, and in what proportion others differ from them in this, as well as in many other respects. The same diversity may take place in regard to the quantity of milk, or its quality yielded by different varieties, and in consequence of that, of the greater or less facility that some varieties possess in rearing and fattening their young: but experiments are here again wanting. Other varieties may be more or less hardy; more or less capable of bearing a stint of food; more or less capable of sustaining inclemencies of weather; more or less liable to be hurt by fatigue; or more or less subject to certain diseases under particular circumstances: but when we come to search for the experiments that would be necessary for ascertaining these facts, they are not to be found; though the benefits that would result from a thorough knowledge of them are obviously incalculable.

In regard to one particular, which is of very great consequence to the farmer in particular situations, viz. the time of going to rut, and of course the season of producing their young; we know of *one* variety of

sheep, which differs considerably from all the others that are bred in this country, viz. that which is known by the name of the Dorsetshire breed of sheep, which naturally produce their young about two months earlier in the season than most of the other varieties of sheep in this island. In what proportion the other breeds vary from each other in this respect has not as yet been ascertained with any degree of accuracy, though it certainly is of very much importance that it should be known.

A diversity is observed likewise to take place between different varieties of sheep, in regard to their tendency to produce more or fewer lambs at a birth. Most of the varieties that are found in the northern districts of this island have a tendency to produce, in general, one, sometimes two, but very seldom three at a birth; whereas in many of the southern districts, two lambs are more common than one, and three are very frequent; and in the Netherlands there is a race of very large sheep, which is represented as producing most frequently three, often four, and sometimes five lambs at one birth. This I know has been in general, like other diversities of breeds, attributed to the richness of pastures, and the genial mildness of climate, rather than to the influence of blood: but that it is not owing to this admits of the clearest proof; for it is universally observed that the same breed of sheep, wherever it is kept, discovers the same propensity in this respect. English sheep, when reared in Scotland, produce the same number of lambs as the same breed usually do in their native districts, while the native sheep there produce few, as in other cases. If the

pasture be poor, or the climate unkindly, fewer lambs indeed will be reared than where circumstances are more favourable, because a greater number of them will perish; but that affects not the natural propensity of the prolific breed to follow its kind.

We have seen that there are some varieties of sheep that produce hair instead of wool; that there are breeds which are brown, black, red, like the sheep which produce the fine *Laine rouge de Caramanie*; buff-coloured, like the Crimean sheep; and mottled of various colour, grey and white. We have seen that others differ from each other in regard to the quality of the meat, the nature of particular substances that are found in some and wanting in others; and also in regard to the proportions of certain productions that are common to all the species. It is probable, however, that this difference extends much farther than we have as yet begun to suspect. I knew a cow which yielded abundance of milk, but from which milk no butter could ever be obtained by any process that could be devised; and it is not a little remarkable, that that cow had been kept for several years by one person without its ever having been discovered, or even suspected, that it had that quality. The milk had always been mixed with that of others, as is usual in large dairies; and it probably never would have been discovered at all, had she not been sold to a person who kept no more than one cow. How many important facts may be lost to the world by inaccuracies of this sort! It is by no means impossible but there may be entire varieties of animals which are possessed of similar qualities with this cow, or other qualities equally different from those that are gene-

rally supposed to belong to the whole of the species. The diversities which take place in these respects are therefore greater in all probability than we have as yet begun to suspect: and, as all these diversities are undeniably propagated by the blood, we cannot be too careful to attend to these particulars, or too assiduous in our experiments to discover them.

One particular which ought to stimulate us in these researches, and which never should be lost sight of in these experiments, is, that there does not seem to be any reason to suspect that any two peculiarities are *necessarily* connected together more than others; such as fineness of fleece with tenderness of constitution; or length of staple with coarseness of pile; or a tendency to fatten with coarseness of wool. Such coincidences may indeed take place in particular cases, but these are merely casual; so that there is little reason to doubt that, by a proper degree of attention to every particular, it may be possible, in time, to unite in one breed all or more of the qualities that can tend to augment its value.

Before a rational attempt can be made to attain this radical improvement (I cannot too often repeat it) we must first not only know distinctly the respective qualities of every variety of animals, and how to blend them so as to produce a mongrel breed that shall suit the purpose wanted, but also to watch with care every accidental variation that may take place in it, and to perpetuate it where that variation tends to the object we aim at. We have already had occasion to remark, that in the production of animals as well as vegetables, nature admits of certain deviations, in which, although the general qualities of the parent breed are not much

altered, yet, that in regard to one certain particular a singular individual will be found to possess that quality in a more eminent degree than the common stock; and that if that individual be selected to breed from, its descendants will continue to possess that quality in nearly the same degree with the parent. In this manner, suppose a breed of sheep to have been chosen as a stock, whose distinguishing characteristic is found to be the quality of generating fat at an early age; the man who possesses such a flock, if he be as attentive as he should be, will discover, in process of time, an individual lamb which possesses this quality in a more eminent degree than the general run of his flock. If this lamb be attended to at the breeding season, and joined with a mate as nearly of the same kind as possible, the descendants of these parents will be much above those of the rest of the flock. These being also carefully watched in their turn, and the best of them kept apart for breeding from, will again produce a breed still better than that from which they were selected; and in this manner will be produced an improved breed of that particular variety of stock from which they first sprang. This is precisely the process that was adopted by Mr. Bakewell, and has been continued by his disciples. In doing this he did well, though we have already had occasion to express our doubts if in other particulars he was equally correct.

It was not, however, so naturally to be expected that he should make inquiries respecting the peculiar valuable qualities which some other varieties of that species of stock possessed in a still higher degree than those he had selected; or to try, by blending these judiciously with his own, to procure by this means

a breed which should possess along with that quality he most valued, several others that would have still farther improved it. He had once obtained a pre-eminence, of which it was natural to suppose he wished to avail himself. This would only have tended to procrastinate his hopes, and to have led him into a train of difficult investigation, in which much money would be expended, and many of the most active years of his life be elapsed before he could come to profit by it, had his experiments even succeeded to his wish. These considerations no doubt deterred him from entering on that career; and must long deter other individuals from attempting it, however much they may be convinced of its general utility.

In commencing an inquiry of the nature in which we are engaged, little more can be done than to glance at a very few particulars, which, having been only partially observed, can lead to no certain conclusions. Should these inquiries be continued for a sufficient length of time, with a due attention to every circumstance, light will spring up from that darkness which so universally surrounds us, and certainty take place of doubt. These hints are intended merely to direct the attention towards proper objects of research. I shall not detain the reader longer on this head than merely to mention one variety of the sheep kind (probably) which is, in some respects, more singular than any we have as yet mentioned. It is that which was first made known in Europe about three years ago by a piece of skin with the wool adhering to it, being sent by Dr. Anderson of Madras to the Editor, which was of a bright golden colour, and pure glossy appearance, that more resembled the brilliant lustre of silk than

any other substance to which it could be compared. It was brought to Dr. Anderson from a great distance inland; being part of the spoils of one of the native princes, which had fallen to the share of a sepoy. As this seemed to be the native colour of the wool, the skin to which it adhered being of a dull white, without the smallest tint of yellow, Dr. Anderson, with great reason, supposes that there may exist a breed of sheep of that colour in some of the northern parts of Asia, which may have given rise to the Argonautic expedition; and that the story of the *golden fleece* may be a real history, and not a fable, as has been hitherto supposed. There can be no doubt that before the discovery of silk in those regions, and ere the art of dying was brought to the perfection it hath since attained, wool of the quality of that fleece must have been accounted of inestimable value. However that may be, it is an object of research very well worthy of being kept in view, to try if the animal which bears this fleece can be discovered; and Dr. Anderson is now engaged in that research. Nor would it be in the least wonderful if it should not be discovered for a long while, even although it should much abound in several parts of India. The *Laine rouge de Caramanie* has been an article of commerce with Europe for some centuries past; and this affords the clearest proof that the creature which produces it abounds in some regions, though no traveller hath as yet taken notice of the sheep which bears that fleece; and it is well known that the veracity of Bernier was, for the best part of two centuries, held in a very low degree of estimation, because he had described the *Nil ghau*, an animal that had never, during all that time,

been seen by any European traveller; though several of these had been during that period at the court of the great Mogul, in whose country it is not rare; and from whence it was brought not many years ago to Britain. Until the creature which produces the golden fleece be found, we cannot speak with certainty concerning it. Those who form their judgment of fleeces from the nature of the pile with which we are best acquainted, might suspect it rather to be a goat than a sheep; for it very much resembles the Angora goat's wool in smoothness and lustre. But I have seen so many sheep that carry lustrous soft hair, that I can draw no conclusion of this sort with any degree of certainty.

[*To be continued.*]

A Query.

MR. EDITOR, can you, or any of your correspondents assign a natural cause for that unusual thickness of the air which has prevailed so much for upwards of six months past; which has obscured the sun to such a degree as hath never before been seen in this country, and so effectually prevented the fruits of the earth from attaining their usual perfection? It deserves to be remarked at the same time, as a singularity of the season, that there has been few or no fogs, little haze, and no unusually intemperate gusts of cold. There has even been no frost that deserves notice at this time, December 10th. It has been merely a steady gloom, accompanied with daily rain, without any unusual dashes of that either at particular times, as sometimes happens. *A. Z. Y.*

NATURAL HISTORY.

On the various ways adopted by nature for the propagation and preservation of animated beings.

[Continued from page 186.]

SEVERAL years ago a gentleman, who amused himself with making a collection of shells, had been particularly attentive to collect together as great a variety as he could find of those snails which are common in this country; these, after having cleaned and dried them, he put up into his cabinet, arranged in the order that pleased his own taste. In this state they remained for many years; being frequently visited by himself or friends during that time, for the purpose of occasional examination, during all which time he conceived them to be as dead as they ever could be; judge then of his surprise, when one day, on opening his cabinet, he found his snails dispersed throughout the whole, crawling about in a state of perfect life, and complete activity. He found, upon examination, that some water had obtained access into his cabinet, so as to moisten these snails, which restored them to life after they had been deprived of all activity, in consequence of the perfect desiccation of all their members, which had thus been bound up in absolute rigidity, which rendered them incapable of performing any of the animal functions for many years, without however, as it now appeared, having the principle of life entirely destroyed. This phenomenon gave room for many speculations in

the literary world: and, though it was less astonishing to those who were well acquainted with the minutest objects of animated nature than to others; because it had been known that some of these could be preserved in a dry state for an indefinite length of time, liable to be revived at pleasure by being moistened with water; yet this phenomenon was a new fact, for it had never once been suspected till then, that any animal body, of a magnitude in any respect approaching to the size of a snail, could admit of having its life prolonged after this manner.

Naturalists had been long acquainted with the winter sleep of bats and several other animals, which, though not a privation of life, is yet a suspension of the principal animal functions for many months together. This seems to be occasioned by the influence of a certain degree of cold which retards, if it does not put a stop to, the circulation during the continuance of its influence. While, however, the germ of life exists, putrefaction is thereby prevented from taking place; and the parts of the body, being unaltered during this period, are in a condition to perform their functions once more after the fluids are set in motion. In the instance of the snail just now adduced, it would seem that the want of moisture produced a similar effect in suspending the animal functions that is produced by cold with regard to the sleeping animals, but in a far more powerful degree; for we are not as yet informed of the number of years (which are known to be a good many) that the vital functions may thus be suspended without being totally extinguished.

There are considerable numbers of the *animalcula*

infusoria, those little microscopic objects that are observed in the watery extracts obtained from the infusion of most dry plants and many other substances, which are known to possess the property of being many times revived, after having been kept in an apparent lifeless dry state for a great while. The most common animalcule obtained from the paste of flour, which so much attracted the attention of Mr. Needham, and many other naturalists, possesses this faculty. The *gordius*, or horse-hair eel, so generally known, possesses the same faculty. While it is in water, it is among the most restless of all animals; for in this state it never has been observed to be one single instant without motion of some sort: but, if the water in which it swims be dried up, it soon loses every appearance of life; the slender body shrivels up, and it may be kept in this state for an indefinite length of time; but whenever you choose to put it into water, its body soon resumes its former appearance; in less than half an hour it begins to move, and in a few minutes more it is as brisk and lively as ever it was. How long it might be preserved in that dried state without losing life, or how often it might admit of being revived, has not been ascertained.

We can speak with a somewhat greater degree of certainty respecting the length of time that an animalcule, which is obtained from an infusion of *Rachitic* wheat, can be preserved alive in a quiescent dried state; for the experiment has been tried for twenty-eight years at least, after the lapse of which period this singular animalcule was found to revive as readily as if its vital functions had been thus suspended

only for one day. The word *Rachitic*, or *Rickety*, applied to wheat, denotes a kind of disease which is totally different from that of smut, or rust. The grain affected with this disease assumes a small shrivelled appearance, and irregular form; its colour is somewhat darker than good wheat of the same kind, but is different from that which is affected with either of the two other diseases. Water, when poured upon wheat of this kind, soon moistens it, and brings to life a number of those eel-shaped animals in various stages of their growth, which had taken up their residence there while the grain was yet in its succulent state, and thus occasioned the disease which produced the alteration in its form. As the grain ripened and dried, these animalcule were arrested in their progress, their life totally suspended, and their destructive operations upon the corn of course obstructed so long as it remained in this dry state. But no sooner does this grain become soft, in consequence of being moistened with water (whether after being sown in the ground or otherwise), than these creatures are restored to life and activity; they soon begin to feed upon the grain while it is moist, and, if not interrupted in their progress by another desiccation, quickly lay their eggs (for it is oviparous) and go through the ordinary evolutions of nature. The young, when hatched in the corn that was sowed, after living upon it for some time, begin to eat their way up the growing stalk, and establish themselves at length in the grain itself while it is advancing towards maturity, where they are arrested in their progress in the manner above described when it is fully ripened.

It deserves to be particularly remarked, that the eggs of this creature cannot be preserved for a length of time in a dry state, and still retain their prolificacy; neither can those among them which are very young, or those which have attained their full size, be revived after they have been dried up. It is only those individuals which are in the full vigour of life, and in a state soon to produce young, that are endowed with this singular faculty. In this case the obvious intention of nature is to preserve the species, by keeping them in life until the grain shall be sown, and thus to have a proper food provided for their progeny, however long that may be.

But nature affords us another instance of a still more extraordinary mode than any of those above noticed of suspending animal life, and preserving existence in an inert state for an indefinite length of time. There has been discovered among the *animalcula infusoria*, one which, from its having the power of exhibiting the appearance of a kind of rotatory motion, by means of certain organs placed on each side of its head resembling a pair of wheels, has been called by the English the wheel insect, *Rotifere* by the French, and *Vorticella Rotatoria* by Muller. This little creature is found in any pool of water on the tops of houses, or otherwise, wherever a cavity (in lead especially) is to be met with.

When a drop of this water is placed on the glass of a microscope, the animalcule is seen moving about with great activity, and is capable of assuming a considerable diversity of forms. But in proportion as the water evaporates, it contracts itself more and more,

shrivels up, and becomes, when dry, like a piece of dried parchment. It is not, however, dead. It may be preserved in that state for many years without suffering the smallest change; but it is no sooner moistened with water than it begins to resume its pristine form; and after a while becomes as lively and active as ever. Suffer the water again to evaporate, the same phenomenon occurs a second time as at first; it becomes a dry shrivelled skin, destitute of every appearance of life, and may be preserved in that state as long as you please. Pour water upon it again, and it is once more brought to life. How often it may be thus deadened and revived it is impossible to tell; the experiment has only been carried so far as to revive it *eleven* times, and there was no appearance of the vital powers being nearly exhausted.

It deserves however to be particularly noticed, that if this creature be put into *pure* water, and that drop of water be once evaporated, it dies entirely, and can be revived no more. For the preservation of its life a little earth, or mud, must of necessity be mixed with the water; in this case it buries itself among the mud, and when thus dried, and only thus, it acquires the faculty of that species of immortality which we have noticed. Thus mixed with the dust in the form of an imperceptible atom, it is blown about by the winds, and though it be deposited upon the tops of houses, and exposed to the most ardent heat, or the severest cold, its existence is not by any means endangered thereby. It has been, for the sake of experiment, subjected while in this state to a heat of fifty-six degrees on Reaumur's thermometer, and to a cold of

nineteen, after which it was equally susceptible of revivification as in any other case. It is only in its torpid state, however, that it can bear these extraordinary vicissitudes: while in its live state, if the water in which it swims be exposed to the heat of the sun for half an hour, it is effectually killed; and a very moderate degree of cold produces the same effect.

There are several other animalcules that may be preserved for any length of time, and revived after the same manner; but it is enough to have mentioned these few, as examples of that kind of preservation.

Since it appears incontestibly proved by the above facts, that animal life can be preserved, in some cases, for an indefinite length of time, as it were, in a dormant state, merely by the desiccation of the body of certain animals; and, as this fact has been brought to light only of late years by accidental circumstances that we should never have suspected by reasoning *a priori*, I shall here beg leave to state one other fact which came but recently to my knowledge. It will be new to most of the inhabitants of Europe, though it has been long known in India; and I state it, as it seems to be nearly connected with the subject now under discussion, in order that it may be subjected to a more minute investigation than it hath hitherto obtained.

I have been assured by innumerable persons who have returned from India, that when the wet season commences, the rain there falls in such abundance as to cover the whole surface of the earth, as if with a sheet; so that wherever there is the smallest inequality

of surface, it flows in a continued stream, as it were, every where towards the lowest places; so that, in the space of a few hours, ponds of considerable depth are formed in every hollow place, in many of which there had not been the smallest appearance of moisture for several months past; no, not so much as to give nourishment to any kind of plant whatever. No sooner, however, does this rain begin to fall, than in the fields, which were in general as destitute of any appearance of vegetation as the most frequented roads in this country are, vegetation commences; and, according to my information, in less than twenty-four hours the appearance of verdure can be distinctly perceived whichever way the eye is directed around. But the most wonderful circumstance that occurs on this occasion is, that almost as soon as this verdure begins to appear, these new-formed ponds are found to be swarming with fishes, of such a size as to admit of being caught with nets, and fit to be used as food by man; they are deemed a great delicacy, and are therefore universally used. It was from a person who had lived at Bombay that I first heard this fact; and it will not, I suppose, appear surprising to the reader that I was rather particular in my inquiries before I fully admitted the fact; but all the persons with whom I have since conversed, who had lived for some time in any part of the peninsula of India, have so unanimously and unequivocally admitted it as a thing there universally known, that there seems to be no room to doubt it.

It is not necessary, as I have been assured, that these ponds should have any communication with rivers: these fishes, they say, are even found in islands where

there is no running water at all during the dry season. As to the length of time that elapsed before the fish were caught after the rains set in, most of my informants had not remarked it in particular; but they all admitted that the fish were brought to market almost as soon as the rainy season commenced; and one among them was so particular as to say, that he had eaten of them within forty-eight hours at least of that period: nor does it seem to be one kind only, but several sorts of fishes that are thus obtained. More accurate observations on this head are much wanted; and it will be very obliging if any person in India, into whose hands this may fall, will be so kind as to observe the facts with accuracy, and state them very particularly, mentioning every circumstance, more especially the kinds of fishes, their size, and the time that has elapsed from the commencement of the rains till the hour when they have been caught. This, or any other information, will reach me if conveyed through the medium of Dr. Anderson, Madras.

Supposing the fact, then, to be established, how are we to conceive it possible that such multitudes of living creatures should be there found, and to have attained such a size in so short a period of time, otherwise than by imagining that on the approach of dry weather these fishes have buried themselves deep in the mud, into which they would naturally dive as low as possible in search of moisture, till at last, when that failed them entirely, they were there dried up like the animalcule in the rachitic wheat, the wheel insect and the snails, and their animal functions suspended without being deprived of life, until the return of mois-

ture revived them, when they instantly returned to their natural element in the same state of growth which they had attained before the period of their desiccation? The analogy is here very strong, and it serves to explain a fact which otherwise seems to be very unaccountable.

There is so strong an analogy between plants and animals, that it is next to impossible to consider any one of these under a particular point of view, without being obliged, in some measure, to take notice of the other. The *Nostoc*, if it be a vegetable, possesses the same quality of being suddenly revived after having suffered an apparent death in consequence of desiccation, and of undergoing these changes repeatedly without any destruction of its vital powers. The *Nostoc* is that flat jelly-like substance which is frequently observed in the fields and upon gravel walks after rain. To a casual observer it appears to be a mere unorganised mass of jelly; but upon a more accurate examination it is found to be a real organic body, which gradually increases in size from an original germ, as plants and animals usually do: but whether it be a plant or an animal is as yet a question. Whatever it may be in this respect, it is certain that the body consists of many delicate membranes of such infinite fineness as to elude most of our senses, being only evident by the phenomena that occur in tearing it, and that of absorbing water and retaining it for a time in a jelly-like form, from which that water may be again dissipated by drought as easily as it is absorbed. When the moisture is thus evaporated, the membranes are so fine as to be altogether impercep-

tible by us. Hence it is, that of all the organised substances we know, this seems to augment with the greatest rapidity; for where these abound they are seen to acquire, in a very few minutes, their full size, which is often more than a foot in diameter, and again to disappear in a period little longer. Whether it can be propagated by fragments, like the polypus, hath not as yet been discovered.

But it is a fact sufficiently ascertained, that the *byssus* may not only be propagated by fragments of any sort, like the polypus, but that it is also endowed, like the wheel insect, with the singular faculty of retaining its life for years together when in a dried state. This is an aquatic production, in which can be perceived neither roots, nor leaves, nor any regular structure. It consists of an immense variety of fibres, which shoot forth in all directions, and are so strongly interlaced among each other, as to form a close matting that may be easily torn asunder, but cannot be separated by art. It is this which forms that green matted fibrous substance which sometimes covers the whole surface of stagnant ponds or pools of water, (very different however from the aquatic lentil, commonly called *ducks-meat*, that often forms a green scum in similar situations). When a pool which is replenished with the byssus dries up, it covers the whole bottom, and as it dries shrivels up, and seems to be entirely destroyed. In this degraded state it remains seemingly dead, often broken into thousands of pieces, and thus to all appearance destroyed and lost;—but no sooner does the water return, than it regains its former state; it becomes fresh and verdant

as before, and spreads its fibres on every side, which soon form a continued matting. If any fragments of this substance, however dry or disfigured they may be, or however long they have been kept in that state, be put into a pool of stagnant water, they there also resume that life which it is easier to lengthen than to destroy.

The *tremella* is a variety of the *byssus* whose history is not so well known as the former; but its fibres admit of such a diversity of movements, seemingly spontaneous, that there seems great reason to refer it rather to the class of animal than of vegetable existence; in which class I should also be inclined to place both the foregoing objects.

The *lichen* is another class of vegetables, which, though they do carry seeds, admit of being propagated also by small fragments of their leaves, which retain their vegetative power in a dry state for a long time, and being carried about by the wind are abundantly deposited every where; so that every substance which is fitted to nourish them becomes abundantly furnished with these plants as soon as it is in a state to promote their vegetation. It is thus that the bark of trees, and the stones in our walls, become so quickly incrustated with that multiplicity of minute plants which soon discolour them every where, though they elude individually the naked eye. Nature seems, indeed, to have been at much greater pains to secure the existence and insure the propagation of these minute existences, both of the animal and vegetable kingdom, than of those of larger growth, probably because these form the basis of the existence of the others.

Next to lichens, that kind of vegetable production which we call mouldiness, which springs up in such profusion on decaying vegetable substances under proper circumstances, and perfects its growth with such rapidity, seems to be endowed with the power of propagating itself more universally than any other substance in nature. Not only are the seeds multiplied to an unexampled degree (a seed springing up and perfecting itself in less than three days, according to the experiments of a very accurate naturalist, who computes that from that single seed in this short space of time is produced at least one million of seeds—Who then can form an idea of the infinite number that would spring from it in one year!) but these are rendered, in some measure, indistructible; for they were found still to retain their vegetative quality after having been roasted in a brazier over red hot coals, and they are so minute as to be carried in the air every where; so that no substance which is proper to nourish them can ever be put into a situation where the seeds can be wanting, and thus they must spring up every where as soon as circumstances become favourable to their growth.

Before the invention of the microscope, when it was impossible to examine the minute objects of nature with a sufficient degree of accuracy, and of course to form an idea of many of those other operations which are now familiar to us, both plants and animals were found in such situations and under such circumstances as philosophers were entirely unable to account for. Hence the idea of spontaneous generation obtained such a firm footing, that it has been a matter of some

difficulty to eradicate it entirely. And, although we are not yet able, nor probably ever shall be able, to explain all the phenomena that nature presents to us; yet, from what we now know concerning this subject, we may be able with sufficient certainty to conclude, that it is only our want of powers which prevents us from perceiving the same laws operating universally with regard to organic life as take place in respect to those that we do know. The facts that are above stated tend to account for many phenomena which, to those who know them not, must have appeared to be inexplicable. We see not only the eggs of animals and seeds of vegetables carried about by the wind, and dispersed every where, but the very bodies themselves of animated beings carried about in the same way; and, though they have lost the form that rendered them cognisable by us, still they admit of being preserved in that state for an indefinite length of time, and fit to resume their pristine figure and their former functions as soon as circumstances become favourable for that state of existence. Our eyes begin to be as yet only imperfectly opened; and who will presume to say what practical inferences may result from a more perfect knowledge of facts of a similar kind?

It is a very common opinion, that the eggs and larvæ of insects are destroyed by the cold of a severe winter: this may be the case with a few, but I suspect it is only a few that can be so affected. Nature is too perfect in her operations to leave any species of animals to the danger of being thus surprised. Sometimes their eggs are endowed with a power of resisting a very great degree of cold, and sometimes

the larvæ, though tender in appearance, are capable of sustaining an intense degree of cold also, without suffering in the smallest degree; and we may naturally suppose, that all those which are left by the parents in an exposed situation are of this sort; the parents of those which are more tender being endowed with an instinct that induces them either to bury them so deep in the earth as to be out of danger of being affected by it, or to envelope them with some warm covering sufficient to protect them.

One would naturally imagine, that no class of animals would be more easily affected by cold than a smooth caterpillar. It is a small naked creature, with a thin skin, which is filled with a watery substance that must be readily (as we should think) and deeply affected by the operations of frost. Yet Mr. Reaumur, on trying the experiment, found, that a parcel of young caterpillars, which he placed in a degree of cold lowered to fifteen degrees below Zero of his thermometer, suffered no injury. Their bodies were indeed in some degree stiffened by it, though he does not think they could be said to be absolutely frozen; yet, when they were afterwards put into a moderate temperature, they went through all their changes as well as any others. Mr. Bonnet found that it was the same case with the common cabbage caterpillar. The same naturalist, for a farther trial, exposed the *chrysalis* of a common butterfly for a whole night to a cold of thirteen degrees of Reaumur, without having subjected it to the smallest injury. Indeed we see the chrysalides of various insects stuck upon the posts of out-houses

every where, which endure the frosts of our severest winters without any injury.

There are many insects, however, which, in their living state, are killed by a very slight degree of cold, and the whole race of which would be quickly exterminated, were their eggs equally tender as the creatures themselves. The silk-worm, for instance, is killed if it be exposed to the moderate cold of seven degrees, [the numbers begin at the freezing point: upwards we call heat, downwards cold], but its eggs have been found to endure the enormous degree of twenty-four, without sustaining any injury. In the egg state, then, this breed of creatures can be preserved without danger in the most rigorous climate on the globe. In the state of an egg, too, the pucerons which we had occasion to mention (page 96), can be easily preserved throughout the winter long after all the parent insects have been killed. To provide for this, we had occasion to notice the singular economy which takes place in regard to these insects, as they become oviparous towards the beginning of winter, though they are viviparous during the whole of the summer season.

One other provision of nature for effectually preventing the destruction of the whole race of these tender insects deserves to be here specified. It has been ascertained by experiment, that the life of an insect may be either shortened or prolonged greatly beyond the period allotted to it in the ordinary course of nature, merely by altering the temperature of the atmosphere in which it is kept. A chrysalis which, if it be kept in a warm stove, will be converted into its fly state in the month of December or January, would

not undergo that change in the ordinary state of our atmosphere until the month of May; and if it be kept in a cool ice-house, it will not make its appearance till the month of August or September. Who does not see how admirably this law of nature is adapted to preserve the existence of the species? It might happen, that if nothing could accelerate or retard their progress, the whole breed might be destroyed at once, by being produced at a time when no food had sprung up on which they might subsist; but under the circumstances above specified it is impossible that this can ever happen; because, from accidental circumstances some of the breed, by having been deposited in places uncommonly cold, will be brought forth at a much later period, and others, from an opposite cause, will be hastened much sooner than their usual time of appearance; so that it can never fail, but that accidental stragglers, as they may be called, will be produced during every season of the year; and if any food at all exists for them, some of these individuals must inevitably find it, and thus be preserved.

There is no doubt but many other circumstances have been employed by the all-wise preserver of every thing for this purpose, were we but capable of observing them. One of these was lately discovered by one of my much respected correspondents, who is a very attentive observer of nature. He had laid up with care, before winter, about a dozen and a half of the aureliæ of the *Bombyx Lanestris*, Linn. to observe their transformation into the butterfly or imago state. In the spring following six of these came forth

in their perfect state. The remainder appearing evidently to be in life, he kept them to observe what would be the result. These continued a whole year longer in this inert state of existence, when six more came out as before into their fly state. The remainder he still kept, and at the end of another year the greatest part of these also were transformed into butterflies, between which and the former breeds he could perceive no other difference, but that he thought they were somewhat more weakly and sluggish than the others. This gentleman, though I do not think myself at liberty to name him, is well known for his great accuracy, and most scrupulous veracity.

I shall here take notice of only one other mode of prolonging animal life, on account of the uses that may be made of it by man, though it has hitherto been considered as a mere matter of curiosity. If a common house fly be immersed in cold water, it soon loses every symptom of life; but every person knows, that if it be taken out of that water after some time, and allowed to dry slowly in a temperate degree of heat, it very soon recovers life, and flies about as if no such accident had taken place. It is not, however, as yet perfectly known how long it may be suffered to remain in that water without being finally deprived of life. It has indeed been confidently reported, but upon what authority I cannot at the present moment tell, that it may be suffered to remain there for several months, or even for years, and still retain the faculty of being revived when taken out of the water under proper circumstances. One would imagine that a fact of so much importance in many respects as this is,

would not be left in a doubtful state; yet, if any experiments have been made to ascertain the truth in this case with the necessary accuracy, they have not come to my knowledge.

Without mentioning other uses that may be made of this fact, if it be so, there is one of much importance in domestic economy, which is so nearly connected with it as to deserve to be adverted to, so far at least as to ascertain, by experiment, whether or not it can apply in that case. The honey bee is one of those insects which can be readily brought to life after it has had its vital functions suspended for some time by being immersed in water. It is in consequence of this suspension of life, that those persons who make experiments on bees are enabled to separate the different orders from each other with the requisite degree of accuracy; for when they are in this lifeless state, each individual can be examined at leisure with the most perfect safety to the operator. In a short time, like the flies, they recover their vital powers, and never appear to have suffered in the smallest degree by that seeming violent operation. I do not say that the life of the bee could be preserved in this suspended state for several months, as it is said can be done with the fly; but I wish to know if ever the experiment has been fairly made? If this question cannot be clearly answered in the affirmative, I will then say that it is an experiment very well worth trying. From analogy we have some reason to think they might be thus preserved. The experiment could be attended with neither trouble nor expence. Should it succeed, the benefits that man would derive from it would be immense. In that case, instead

of smoking a beehive with sulphur, and thus destroying all the bees in order to get the honey, they might be stifled for a time by water, and thus preserved till the fine weather in spring returned. Not only might those bees be saved which were doomed to destruction, but those also which otherwise were to be kept through the winter might thus be preserved without any food, and the whole of the honey they would have consumed be appropriated to other purposes. The creatures themselves would also be freed from the misery they too often experience in the spring from want of food, as they might be preserved in their torpid state, like the eggs of silk-worms, until settled weather set in, and abundant food for them was to be found in the fields. Should it fail, the experimenter could lose nothing; he would only add one fact more respecting this singular and useful insect to those with which we are already acquainted. The present is the season for trying the experiment; and it is for that reason that I now beg leave to suggest it. Should any of my readers be inclined to try it, I would humbly suggest, that it might be well to begin at the first, by trying to revive them after they had been immersed only for short periods of time. It is very certain that they can bear to be immersed without danger for at least one minute. Let a considerable number then be immersed all at once; after one minute by a proper watch has elapsed, let a few (say half a dozen) be taken out; as many more after two, three, four, five, six, eight, ten minutes have elapsed. Let each of these parcels be laid upon very absorbent paper to imbibe the moisture (common salt is usually strewed upon the flies

for that purpose), and placed upon the hearth, so as to be within the influence of the heat, but not too near it. Let them be carefully watched, and every circumstance minuted down as it occurs with the most scrupulous accuracy and fidelity. I should think it unnecessary to go farther than is above specified with the first experiment; for if it shall appear that they are all effectually killed before the ten minutes are expired, it will be quite needless to carry it farther. But if it shall be found that they revive, then a second experiment may be made, beginning where that one ended. In that case, the first period might be fifteen minutes, the second twenty, and so on to the end of one hour. If it should be found that they can still be revived at the end of that period, let another experiment be made, leaving an interval of a quarter of an hour between each trial; and so on, by repeated experiments, for longer and longer periods as you proceed, until it shall be found that the bees can no longer be recovered in any way. Thus will the experimenter have the satisfaction of being able to ascertain at least one useful fact in his progress through life. I need not recommend the importance of avoiding all extremes of heat and cold in the course of this experiment, or to guard against all unnecessary handling or friction in the progress of it; for these will be obvious considerations.

N. B. *It was once intended to have noticed in this article the singular species of vegetable revivification known by the name of the rose of Jericho; but, as this account must have been given from the relation of*

others, and as it appears to be, by these accounts, of a nature so very uncommon as to excite suspicions as to the reality of the phenomena, I entertained some doubt whether, under these circumstances, it would be proper to notice it at all: but at the moment I was balancing on that head, I received intimation from a friend who has one of the buds, that I might have an opportunity of seeing it when I pleased. This kind offer I shall take an early opportunity of embracing, and hope to be able in the next number to give a correct account of it, accompanied with figures.

MISCELLANEOUS LITERATURE.

On the Gooseberry Caterpillar.

To the Editor of Recreations in Agriculture, &c.

SIR,

YOUR correspondent *Verax* (p. 135), did right in distinguishing the two kinds of gooseberry caterpillars from each other; they are both pernicious to that favourite shrub; and, as the public are ever desirous of learning how to secure fruit-trees from the ravages of destructive insects, I shall beg leave to add a few farther particulars to those which you have already brought forward for that purpose.

Though the caterpillar of the *phalæna grosulariata* be the largest of the two, yet I am inclined to think it is the caterpillar of the *tenthredo* that does the principal mischief, as those of this species are more numerous, and multiply faster than the other: my at-

tention at this time shall therefore be principally directed towards them.

Verax hath justly observed, that the tenthredo breeds twice a year. Its regular procedure is thus: the chrysalides which have been deposited in autumn at the bottom of the stem, remain in that state till the warmth of the spring brings forth the leaves, and soon after the fly appears, which deposits its eggs, from which, in a short time, issue forth the young fry which are to feed upon them. These are at first very small, and do little mischief; but as they increase in size, their ravages become extremely perceptible. They belong to the class of gregarious caterpillars, as you have justly observed, so that they love to feed as close together as they can; and by this means give a good opportunity of having them destroyed by picking off the leaves, as you direct; and if this be done at an early part of the season, and with sufficient care, they may be almost entirely destroyed by that means. Notwithstanding the utmost care that can be taken, however, some individuals will escape. These, when they are about to enter into their chrysalis state, hide themselves in the earth, where they undergo that change, and after a short time come forth in their perfect fly state. This generally happens about the month of July, when, if you once more examine your bushes, you may perceive them; but this creature is so small, and so much like the common house fly, that few persons who are not professed naturalists take any notice of it. The tenthredo, however, is greatly more sluggish than the common fly. It often remains quite stationary for several

minutes together, and is not easily disturbed. From this circumstance, and a yellowish tint which can be perceived on it, it can be readily recognised by a common observer, even without taking notice of its four wings, which clearly distinguish it from the fly; but these are not easily seen, unless when it extends them, which is but seldom. This sluggishness of temperament renders the tenthredo an easy prey to birds who seek after it, and likewise puts it in the power of man to destroy it readily by hand; nor ought he to neglect to do so as fast as he can. If these be neglected, they soon find their mates, deposit their eggs in great numbers, and then die. They should therefore be searched for as soon as they appear, and then destroyed before they have time to lay their eggs; otherwise the killing them will be of no service, as all the ill they can possibly do will have been already done. The eggs very soon hatch at this season of the year, and the young caterpillars, if these precautions have been neglected, issue forth in swarms, and destroy the leaves in autumn. This brood has a much better chance of escaping the birds than that in the spring; for now the birds have much greater abundance of other kinds of food to allure them from it; but the season is more precarious, and in backward years the leaves sometimes fail before they are converted into their chrysalis state, and then these of course all perish. Such of them as have gone into their chrysalis state, and are surprised by the cold weather, pass the winter in this state; which are changed into a fly early in the spring. These in a short time deposit their eggs on the under side of the young leaves, where they may be seen in rows like little white specks along their

ribs. This would be a proper time for picking off the infected leaves, were it not for the difficulty of observing them, on account of the lowness of the shrubs. If this be attempted, the leaves should be carefully carried out of the garden; but the safest way is to hunt the fly as soon after it appears as possible.

One particular, sir, that you have taken notice of deserves to be here remarked more particularly: it is, that when bushes have been much injured by the caterpillar in one season, there is a great probability that they will not be free the next, or for many succeeding years. This is almost infallible if it has been the tenthredo caterpillar that has done the mischief, and if it has been suffered to escape with impunity; for, as the fly of this species seldom moves far from its native place, it generally rests upon the bush at the bottom of which it was produced, and there also deposits its eggs. If the mischief has been done by the phalæna caterpillar, this is not so likely to happen; as the butterfly is more active, and takes a much more excursive range, so that it may deposit its eggs at a considerable distance from its parent bush.

From these notices, sir, your readers may easily perceive that it is by no means such a difficult matter as is commonly imagined to preserve gooseberries from this destructive ravager. It is a process of the same sort with that of freeing a garden from seed weeds. If they have once obtained possession of it, no inconsiderable pains are required *at the beginning* to root them out; but if the exertions be then great, so as to allow few to get to seed, and if that attention to prevent their running to seed be never discontinued, it is well known that after a short time scarcely any

weeds but those which spring from casual seeds, brought by wind or other accidents, ever appear, and these few when they do appear are easily plucked up. The case is so exactly the same with this caterpillar, that I need not dwell upon it farther than barely to remark, that in killing one animal you infallibly destroy many hundreds of eggs, so that a little attention in this way is very well bestowed.

With regard to the caterpillar of the phalæna the case is a little different; but fortunately these are less numerous, and of a larger size than the other, and therefore more easily seen, and may, of course, be picked off with less difficulty; neither do they multiply so fast, as they breed only once a year. That your readers may be able to distinguish these, and act accordingly, I use the freedom to send you, with this letter, a well preserved specimen of the phalæna grof-sulariata, and also of the tenthredo, which, if engraved in your usual manner, will enable any one to know them at first sight. I am sorry I did not take drawings of the two caterpillars at the proper season; but they may be easily recognised by the following descriptions:

It will be easy for a professed naturalist to distinguish the two kinds of caterpillars, merely by being told that the one is changed into a phalæna, or butterfly, and the other into a fly with transparent wings; but to others more particular information becomes necessary. These should be informed that there are two classes of caterpillars which are easily distinguishable from each other chiefly by the number of their legs. Every caterpillar has six hard, or horny like legs placed on the fore part of the body, and several

pairs of cartilaginous legs, which differ in number from each other. It has been remarked, however, that no caterpillar that has above sixteen legs in the whole is ever converted into a butterfly of any sort; and that, of course, every caterpillar that afterwards is converted into a fly of any sort has eighteen legs at the least, or more, up to twenty-eight. Those of the first class only have been called by some naturalists caterpillars, and the others have been denominated false caterpillars; but this distinction is not now so much regarded as formerly, since all insects have come to be classed only while in their perfect state. The tenthredo caterpillar has twenty legs; that of the phalæna only sixteen. They may be easily recognised at first sight by their habits and general appearance, although their colours are much the same, green being in both the predominant; that of the phalæna is, in all its stages, of a larger size, and does not go in groups, its head more pointed, and not so much of a ball-like form as the other. A good figure of the phalæna and its caterpillar is given in Curtis's directions for preserving insects; that of the tenthredo and its caterpillar in Reaumur, T. V. Plate X, Fig. 4, 5, 6, and 7.



The *phalcena grossulariata*, of which an exact figure is here given, is white, the spots are velvety black, with some sulphur-coloured streaks, which are marked by lines on the engraving. The fly exhibits a faint and scarcely perceptible yellowish tint. Its four wings are only discoverable when it spreads them out for flight, which it rarely chooses to do. ALBINUS.

It is proper the reader should be informed that in the preceding part of this essay, and those that are to follow, the word ARCHITECTURE is always employed in its most extended meaning, denoting the science which respects the arrangement and distribution of the parts of any structure erected by man, either for utility or ornament.

Thoughts on the origin, excellencies, and defects of the Grecian and Gothic styles of Architecture.

PART. II. *On Gothic Architecture.*

IT has been already observed, that internal decoration, or the accommodation of private individuals, formed no part of the system of architecture invented by the Greeks; nor did the Romans, except in a very slight degree, attempt to supply that deficiency. They did, however, attempt it; and in this, as in every other attempt which they made toward improvement in matters of taste, they proceeded in an awkward and bungling manner. When individuals at Rome acquired great wealth by robbing the distant provinces, and other measures of a similar kind; toward that period, when luxury with such rapid strides paved the

way for the downfall of the empire, large apartments were sometimes necessary for the accommodation of the numerous guests who were assembled together to participate in the sumptuous entertainments of the affluent. We cannot now correctly trace by what devices they were enabled gradually to increase the size of these apartments till they reached their fullest perfection in this respect; but, by the writings of Vitruvius and others, we are made perfectly acquainted with the form and internal decoration of those apartments which were reckoned, to excel all others in elegance and grandeur, when the Roman empire had reached the zenith of its wealth and power. These apartments Vitruvius has accurately described and delineated under the denomination of *Egyptian halls* (probably because the first apartment of that kind had been erected by Mark Antony in Egypt for the sake of Cleopatra, of whom he was so deeply enamoured): but, wherever this kind of saloon was first built, or by whom invented, it is evidently nothing more than an awkward attempt to introduce the Grecian colonnade into the inside of an apartment, in which situation it loses all its original beauty and utility, and has the inconveniencies to which it was subjected without doors greatly augmented. Yet even this innovation, because of its novelty, and the superior size and splendour of such saloons, when compared with those which had been formerly in use, was applauded at the time as a most sublime improvement in the art, and must, of course, be accounted superlatively elegant by all the *counoscenti* of our days. Even in our own time, and long after many models of internal struc-

tures, infinitely more perfect in their kind, had been invented and exhibited in every country of Europe, the infatuation of which I complain was so strong as to blindfold a man of the first eminence in this kingdom for taste and many other acquirements to such a degree, as to make him believe that no other mode of internal arrangement which had ever been devised could, in any degree, be compared with this in respect to elegance and grandeur. The earl of Burlington, so well known for his taste and architectural acquirements, actually conceived the idea of building an assembly-room at York on that model, and had influence enough to get it erected and finished to his own taste, according to the original design furnished by himself. The room, when finished, obtained, as was to be expected, the most unequivocal approbation of every *connoisseur*, and has been held out to the public by them ever since it was erected as an unexceptionable model of the chastest style of elegant Grecian architecture. The *people* praised it, as they must needs do, or be accounted destitute alike of knowledge and of taste; but every one in his heart thought it was a dull and heavy building. In course of time one person ventured to whisper to another in private his sentiments concerning it; and they soon found that others had felt as they had done. It was, however, tolerated for many years, more on account of the expence it had cost, and the difficulty of finding another in its stead, than from any other consideration. But at last the disgust to it became so universal and so strong, that it could be no longer endured; and, notwithstanding the expence that must in consequence

be thus incurred, it was at last abandoned, as I have been assured, and another room erected in its stead that was thought to be much better suited to the purposes for which it had been originally intended.

What other improvements or alterations the Romans might have made in this respect, had the power of their empire been continued for a sufficient length of time, it is impossible to say. Their progress in the fine arts was here suddenly arrested by the interruption of those savage tribes from the north of Europe who conquered their distant provinces one after the other; and at length, after a struggle of many centuries, overturned the empire itself, and buried in one indiscriminate ruin the finest productions of art, together with the persons who were capable of executing them. It is impossible to trace the subsequent progress in the domestic arts of a barbarous people, who, for many ages, seemed to delight in nothing so much as in obliterating every mark of human civilization, even to the art of writing itself, which could only, perhaps, have tended to record their own shame. Ignorance and impenetrable darkness universally prevailed; that kind of darkness which was only rendered visible by the accidental explosion of deeds of horror, which, like the smothered volcano, sometimes bursts forth, and exposes to view, for a moment, the devastation which it scatters to all around it.

Yet amidst this accumulated ruin the Christian religion survived. The sublime purity of its doctrines astonished these brutal ravagers to such a degree, as to produce a kind of veneration in their untutored minds that could scarcely be deemed short of idola-

try itself. Every thing connected with that religion came to be by them accounted sacred. Its ministers thus acquired a power over the human mind that was unequalled at any former period of time; to preserve which, no art that a fertile imagination could suggest was omitted. Pompous processions of venerable men clothed in gorgeous robes, were not among the least imposing of the means adopted for that end; and superb temples adorned with every thing that could give an idea of supereminent wealth and power, were, with the same view, considered as objects so very desirable, that they could not be purchased at too great a price. In this way architecture was the first of the fine arts that came to be studied among this ignorant people: but by what steps it was gradually revived, and in what manner it advanced in those dark ages, we may conjecture, but shall probably never be able clearly to discover; all we know with certainty is, that many churches of large dimensions were erected of *wood*, long before the æra of any certain records in Europe; and that the frequent destruction of these churches by fire, during the uninterrupted warfare that was carried on between hostile tribes, produced an universal, and, we need not doubt, a most earnest desire to see if it were possible to get others reared of stone, that should be, in all respects, suitable to the high ideas of awful superiority which they wished to impress upon the minds of the people concerning every thing that was connected with sacred things. As the clergy had in those days all the power, and consequently the command of all the wealth of Europe, they were enabled to hold forth strong allurements to

those who should best exert their talents for the purpose of carrying into effect these objects of their warmest wishes.

Strong allurements will never be long held out in vain to man for the purpose of exciting his powers, whether of body or of mind: nor could we perhaps produce a better illustration of this axiom than the instance before us affords. We know not the steps by which these artists raised themselves to such an exalted eminence above the general mass of ignorance that surrounded them; nor have we any other way of forming a judgment of their ultimate acquirements, than by an exact analysis of the works they have left behind. We are only free to conjecture, that it was at this period, and for the purpose of perfecting themselves in this much-cherished art, that some of the persons who had made the greatest progress in these studies associated themselves together for the purpose of reciprocally communicating the particulars which they had separately been able to acquire, that thus the general mass of knowledge might be the more speedily augmented. And as knowledge of this kind was, to each of these individuals, the undoubted power of acquiring wealth, it was natural for them to bind each other, under the most sacred ties they could invent, not to divulge to any one out of the society the secrets they should thus attain. In order that this kind of communication should not be interrupted, and that every one might be at liberty to pursue his studies by himself in the manner best suited to his talents, situation, and circumstances, but so as still to divulge to the society the whole of the discoveries he should

make, care would be taken to appoint meetings at stated and convenient times, for the purpose of communicating all useful information to each other; and, as talents are not confined to one language, or people, but are distributed by the giver of all good with nearly an equal liberality among all nations; and as all people then worshipped the same god according to a ritual universally adopted, these men, whose sole object was to erect temples to the universal father of all mankind, considering the whole of the human race as brethren, readily admitted every individual into their society who professed himself determined to apply his whole powers towards the perfecting of that great object which they had all so much at heart. Thus it happened, by one of those arrangements of nature which we sometimes call strange fatalities, that in an age when anarchy universally prevailed, and inveterate warfare and bloody strife pervaded all nations, was formed an institution whose basis was universal kindness and brotherly love.

Such I conceive to have been the origin and primary object of that institution, the shadow of which has been transmitted even to our days (long after the soul and spirit of it had evaporated), under the name of the fraternity of *free-masons*, concerning the present state of which fraternity so much has been written of late.

Whatever may be the uses or the abuses of that fraternity in our day, we can scarcely form an idea of a plan that in the then state of the universe could have been so well calculated as that was for effecting the purpose intended. Books were not to be had, so that

no information was to be derived from that source; and meetings in public for the purpose of freely discussing these subjects, as under the porticoes of Athens, while they would have alarmed the clergy, ever jealous of preserving the impresion of their superior abilities among the people, it would at the same time have rendered common to all, that knowledge of which they wished exclusively to make profit. Neither would it have been possible for any deep investigation to have been pursued so far as was necessary in a public manner among a multitude of men immersed in total ignorance. By the plan they adopted, each of these difficulties was clearly avoided: in consequence of the universal correspondence that was thus established among all nations, they concentrated within a narrow sphere the whole of the knowledge belonging to the fraternity, where, like the solar rays collected in the focus of a burning glass, the effects were vivid and powerful. No knowledge that was thus once obtained could ever be lost; and while they were advancing with the ardour which energetic minds must ever feel while they have the prospect of effecting astonishing things, the tongues of the weaker brothers were tied up from babbling. Thus they went on for ages in a silent but uninterrupted progression, as takes place universally in the irresistible operations of nature; and the wonders of their power were only to be appreciated by its effects after it had been exerted.

We have undeniable evidence, that the first exertions of these enterprising artists, like those of ancient Greece, were employed in constructing edifices of

wood; but we are nearly as much in the dark respecting their first rude attempts, and the steps by which they gradually reached that degree of perfection they at last attained in this particular, as we are respecting most of the other discoveries in useful arts that were made in the early periods of society. We only know for certain, that they attained at length the power of rearing spacious structures of vast extent, which afforded abundance of light and every other convenience that their rites of worship required; and exhibited a display of internal magnificence that left all the works of antiquity in that line at an amazing distance. What the particular devices were by which they found themselves enabled to effect these things, we can at best do no more than form some probable conjectures. But from the few specimens of wooden roofs that remain, which were constructed by artists during those dark ages which we very unjustly, in this respect at least, style barbarous, we shall be obliged to conclude that they must all have been constructed upon the soundest mathematical principles well understood, as applied to materials possessing the qualities and powers of those upon which they operated. The fine roof of Westminster Hall, and that still finer one of the parliament house in Edinburgh, afford sufficient evidence of this. Whenever these shall be examined by a man who shall have made such a progress in that science which must have directed the hand of the artists who constructed them, as to enable him to appreciate their merits, he will find that the term *barbarous*, which he was prepared to adopt as applied to them, will be arrested before it reaches the lips, and

that of *wonderful* forced out in its stead. Wonderful, indeed, such operations may be deemed, when they are compared with any thing else respecting the state of science or of arts, that occurred at the period of time when these roofs were constructed: nor will he be inclined to withdraw the word when they shall be compared with any work that required the same kind of knowledge of the principles and power of the materials that has been executed in wood by any of the artists in Britain, even after we have made all those improvements in science that constitute the pride and the boast of the present age.

When at last the concurring voices of all the people in every nation in Europe coincided in calling upon these artists to endeavour to erect structures in stone that should admit of every convenience, without losing any part of the elegance possessed by those to which the people had now, for so long a time, been habituated, and of course accustomed to admire, their attention would of necessity be strongly attracted to the subject; and the nature and properties of the substance they were about to work upon must have been an object of long and very deep investigation before they could dare venture to form an idea of the possibility of effecting a thing so seemingly beyond the reach of any human powers. That they investigated this subject upon the soundest principles of mathematics, we can have no doubt; not only from this consideration, that a set of men, who had been governed in all their operations upon wood by mathematical principles, would naturally apply the same principles in directing them how to employ any other materials for the purpose of

erecting similar structures: but still more must we be convinced of this truth, from a careful analysis of the structures erected by these men, which still subsist in our day; and which we shall find, when thus analysed, exhibit the most undeniable proofs of such a consummate degree of knowledge of those principles that were necessary to give stability to their works in every situation, as gave the artists a power to perform whatever they wished to effect, by devices of the simplest kind that the nature of the case could possibly admit. It is in this deep knowledge of the scientific principles of masonry, that we are to seek for the origin of those forms which peculiarly characterise that mode of building which has obtained the name of Gothic, and not in the capricious whims of a disordered imagination; nor in those fantastical analogies which it has been but too much the fashion among ignorant men who have pretended to decide on this subject, to hold up to public view with scorn and derision, as the only circumstances which had influenced the conduct of these much injured, though never-enough-to-be-admired, nameless humble and self-taught artists.

When these men came to reflect seriously upon the subject, the first circumstance that must present itself to them would be, the impossibility of forming a roof of stone of such ample dimensions as those which they had acquired the power of constructing of wood. If they should attempt to support it by means of pillars of stone after the manner that had been practised in those few models of Grecian or of Roman architecture which had been preserved till their time, they would

at the first glance perceive, that the area would have been so much crowded with massive pillars as to have buried the centre in the most dismal gloom, and not to have admitted of a successful display of that splendour at which they aimed: nor could space have been obtained for the exhibition of that grandeur which constituted such a striking part of the rites of the church. Every idea of that mode of construction must have been, upon these considerations, entirely laid aside from the moment it obtained a serious investigation, as being in all respects incapable of answering the purpose intended.

The first idea that, under these circumstances, would present itself to the mind of the artists as an improvement, if they could devise a method of doing it, would be, that of diminishing the number of the pillars required for supporting the roof; but how this could be effected, must have appeared, to men who had never practised the art of building in stone, a matter of the most serious difficulty. In studying the remains of those few ancient buildings of stone which had withstood the ravages of time, and which, from the moment our artists had conceived the idea of attempting to rear structures of similar materials, must have been examined with the most minute degree of attention, it would not be long before they would remark, that there was a possibility of closing an aperture in a wall by means of an arch thrown over it, although the distance between the two sides of it was too great to admit of a single stone being found that could reach over it. It is but going one step farther to say, might it not be possible to connect the co-

lunns together by means of arches, instead of the solid architrave of the Greeks? To solve this question, they must study, in some measure, the nature of an arch, and the principles upon which its stability depends. They had now got possession of the clue that was to guide them through the intricate labyrinth in which they had been wandering so long, without a glimmering of hope that they could ever get out of it.

They would thus be able, in a short time, to perceive, that if a row of arches of the same size and form were to be made at moderate distances from each other in the same wall, the solid pillars from which these arches sprung, by being loaded with an equal weight on each side, would thus have a tendency to be pressed directly downwards only, and not to be pushed in the smallest degree to one side or the other; so that, if the stones of which these pillars consisted were true and fairly bedded, there could be little danger that such pillars would be deranged by the weight that was laid upon them. Here then was one great step gained, which would encourage them to proceed with their inquiries.

If a row of pillars connected by arches can be thus built in one direction, why may not a wall which intersects this wall (now consisting of arches and pillars) at right angles be constructed on the same principle as the former? It is evident, that this last wall cannot be affected by the first named in the slightest degree, except at the precise point of intersection; and if that point of intersection be one of the pillars, and the thickness of the wall be the same as the

width of the pillar, this intersection can have no other effect upon this square pillar than merely to add double the weight that it had before to support; for it will be now equally balanced on both sides, from south to north, as it formerly was from east to west, so that it must stand equally firm as before, if the materials of which it consists be so firm as not to be in danger of being crushed together by the pressure.

Here then we have a distinct view of the steps of that process by which our artists acquired the original idea of placing their columns at a much greater distance from each other than the artists of Greece or Rome could ever accomplish, and of joining them together by means of arches for supporting the roof. It is this particular that constitutes the characteristic feature of the Gothic architecture, and discriminates it from that of Greece and Rome: nor shall we find any difficulty in tracing, in the future numbers of our work, with equal precision, the origin and uses of all those lesser devices which were afterwards adopted as natural and necessary modifications of this grand principle, as it came to be applied to the particular purposes it became necessary to effect, which have been so much misunderstood, and so often made the butt of a senseless ridicule, by ignorant witlings in modern times.

[*To be continued.*]

Extracts from a manuscript Account of the Loss of the Winterton East Indiaman upon the coast of Madagascar in August 1792.

[Continued from page 232.]

RELIGION OF THE INHABITANTS.

“ALL the nations in the world acknowledge a supreme power; and the only difference between religions lies in the manner of making that acknowledgment. The Madagascarese in the neighbourhood of St. Augustine’s Bay have evidently a divinity, upon whom they believe they depend; but a clear insight into the nature of their religion we could never obtain; however, from what they told us, their idea of a future state of rewards and punishments must be pretty distinct; at the same time that it is accompanied with a wildness and simplicity. They look for perfect happiness in heaven, there possessing fully what they prize most on earth. We could never find out among them any place of worship. There is only in each village a large tamarind tree, to which they pay particular respect, not allowing it to be carved upon, nor any otherwise injured. Neither did we ever see them engaged in the worship itself, excepting it was in the case of one of their neighbours being sick, when a great concourse assembled round his door, and made the most dreadful noise, singing, clapping their hands, and beating the ground with their feet. When it was a person of distinction, they had a drum, and a stick, through which they blew, making the noise still more

unpleasant. The friends frequently add to that the sacrifice of one, two, three, or perhaps more bullocks, according as the sickness is more or less great. Nor do they always offer up the sacrifice in the same manner; but have several different forms, in the using of which they are probably regulated by the nature of the indisposition; but all of them are accompanied by many ceremonies, that occupy sometimes the space of three or four hours. These ceremonies being ended, the bullocks are cut up and divided among the friends of the sacrificer; it is, however, reckoned unlawful to give away any part of them to dogs. If any one is unwell, his friends have immediately recourse to stones of the tamarind trees to know what will be his fate; but the use of them is involved in much mystic darkness. They have likewise recourse to them in case of absence from their friends to know the state of their healths. The men always wear about their necks a kind of small leathern bag, in which is contained two or three pieces of a particular kind of wood, to which they imagine is attached a peculiar charm: without these, they will on no account go upon any journey. They have even their bed hung with them to keep them from harm in the night. When any of the natives has received a hurt, he rubs the place affected over with a white substance taken from a stone, which they seem to reckon in most cases infallible. It is customary when one dies to discharge one or more muskets over his grave, according to the distinction of the deceased.

“The governor of St. Augustine’s Bay died when we were on the island. At his interment there was a

continual firing kept up during two days, accompanied, as we were told, by the sacrifice of a hundred bullocks. The inhabitants of St. Augustine's Bay likewise destroyed or abandoned their old tents, and built themselves new ones at a considerable distance from them

“ We may reckon among the religious institutions, a trial which we saw take place in the case of a native's being accused of stealing. He tried to acquit himself of the charge; but his defence, apparently not being satisfactory, it was required that he should drink some of the blood of a bullock; which, in case he was guilty, as was understood, would prove poisonous to him. A bullock was accordingly brought and thrown upon the ground, when one of the council repeated a long prayer full of anathemas and curses against the accused person, if he was culpable, all the while striking the animal with a lance which he held in his hand. Having finished his prayer, he stabbed it in the back, and caught some of the blood in a cup. He put in it a piece of gold that the king wore about his neck, and then presented it to the accused, which he drank, and was acquitted. The animal was killed, and disposed of as usual.

“ The only sort of religious record we could see was at St. Augustine's Bay. It filled several sheets of writing paper, and was only intelligible to the physicians, which leads to believe that they are likewise a sort of priests. In fact, this was the only vestige of a record that we could ever hear of; they appearing to have not the least idea of preserving the annals of past times.

“To conclude this section on the religion of the Madagascar men. There are no people in the world that seem happier in themselves, or that practise the social virtues better than they do, whatever their religion be; and what more can be asked? Where little is given, little will be required.

NATURE OF THE CIRCUMJACENT COUNTRY.

“THE country, as already observed, is in that quarter very barren. The soil is dry and sandy, and almost entirely covered with trees and bushes. There grows, however, a considerable quantity of wild cotton, of which the natives make their clothes. In the inland parts of the country iron is found, by the help of which the natives make their lances.

“From different sites in the island there are some very fine prospects. St. Augustine’s Bay is a delightful place, and ships frequently stop there; though the entrance into it is rather dangerous, on account of a reef of rocks which extends many miles along the coast.

ANIMAL PRODUCTIONS.

“THERE are not in the world finer nor larger bullocks than on the island of Madagascar. Some wild hogs also are found there; but they are very harmless. The only animal that is at all dangerous is the alligator, which sometimes attacks the cattle as they are driven through the rivers; but all that is necessary to prevent this, is a little care in clearing the way. There are snakes too; but they are in general very small.

“Of birds we saw some small ones with the most beautiful variegated plumage. There are partridges also,

and guinea fowls; the former of these are larger than those in England, and so very tame that a person might almost catch them by hand. [Would it not be worth while to try to domesticate this species of bird, and to introduce it into Britain?]

“There is likewise an abundance of very fine fish on the coast; but none of the natives, except those who live close to the sea-side, seem to pay much attention to fishing.

CLIMATE.

“THE climate was, at the time of our arrival, very fine, and for about six weeks we enjoyed tolerable health, notwithstanding the disadvantages attending our situation. But from the end of October, to the middle of March, it was extremely insalubrious, to which the numbers that we lost bear ample testimony. Not one of us escaped the fever; and so violent was it in its effects, that it used frequently to carry off two or three in a day. To assuage its virulence there were no medicines, except a few emetics, which some person had saved; nor any wine or spirits: so that the only relief we could look for was from the hand of Nature. In some degree, indeed, she befriended us, by deviating from her usual course, and sending a most uncommonly dry season; for, instead of the heavy rains which they commonly have during the months we were there, not above four or five showers fell the whole time; and though this great drought gave a serious check to vegetation, yet, as we were afterwards told, it was the most fortunate circumstance for us that could have happened, the climate being infinitely more unhealthy in a wet than in a dry season.

“To add to what was suffered from the disease of the country, which was common to all, many of the people, whose money had been expended, were almost starving, and only lingered out a miserable existence upon the bounty of the natives. A gloom began to hang on every countenance. We had for several months given over the yawl as lost, and now only cherished a distant hope, that some ship might accidentally come to our assistance.

DEPARTURE FROM MADAGASCAR.

“WHILE we were in this melancholy situation, the natives, on the forenoon of Sunday the 25th of March, suddenly set up the most violent shouting, firing their muskets at the same time, and singing, as they generally do when any happy occurrence takes place.

“We were for some time left to our own conjectures as to the cause of this noise; but it is impossible to express the joy we felt when we found that it announced the arrival of our third officer.

“This event was so unlikely, that for some time we could with difficulty credit our own eyes.

“When the yawl was first dispatched for Mosambique, it was generally expected that relief would have been brought us in less than five weeks. After two months, therefore, we despaired of ever seeing her more, and concluded that she and all who had gone in her had certainly perished.

“Provisions for twelve days had been sent with them; but as they became spoiled, they were under the necessity of standing immediately in for the Afri-

can coast, and reached Sofala, a Portuguese settlement, in the latitude of twenty, ten days after they left us, having been for two or three days almost without any thing to eat. There they exchanged the yawl for a long boat, which they rigged and put out to sea with the intention of going to the Cape of Good Hope; but they soon found that the boat was so leaky, and in such a crazy condition, that it was impossible to proceed; they therefore returned to Sofala, whence they set out for Mosambique by land.

“ In their way they came to Senna, another Portuguese settlement, where indisposition forced them to remain some time, and where they unfortunately lost Mr. Wilton, the fourth officer. They afterwards proceeded to Mosambique, where they arrived in the month of February, after having gone about three hundred miles, the greatest part of which they had travelled on foot. The time seems long for so small a distance; but when we consider the numberless hardships they underwent, all cause for wonder will cease; and it will only remain for us to entertain a most grateful remembrance of their sufferings, to which we certainly owe our preservation. Mr. De Sowza sailed soon after for the Mauritius.

“ Mr. Dale returned to Madagascar in a small brig which he had freighted; and upon his arrival we immediately prepared for moving. The ladies were carried down to the sea side, whence they were conveyed in the ship's boat to St. Augustine's Bay, where she was lying. Such of the gentlemen as could not walk were likewise carried down to the sea side, where they engaged canoes. As the vessel was only of about

one hundred and fifty tons, and had been necessarily fitted out in a hurry, the accommodation was, of course, very bad, and there was only a small confined cabin for the ladies. But so glad were we to get from that melancholy island, that we willingly accommodated ourselves to any difficulties; nor did we ever complain, though we were continually exposed to the cold and rain, of which there fell a great quantity during the passage. Fortunately, however, it was short, and in eight days we reached Mosambique.

“ This is a small sandy island, about nine miles from the main land; it measures about a mile and a half in length, and is half a mile broad. The town is defended by a fort, which, however, is weak, and badly garrisoned. There is an excellent harbour; but it is necessary for those who enter to be well acquainted with the coast, as it is surrounded by rocks.

“ This island is the most miserable place in the world; it is thinly inhabited, and what Europeans there are here, are the very refuse of the Portuguese. There is little or no trade carried on, except with the French, who sometimes come from the Mauritius to buy slaves. There are a governor and council; but their chief object seems to be, to cramp and discourage trade as much as possible.”

To the Editor of Recreations in Agriculture, &c.

SIR,

As your aim seems to be to improve, I beg leave to lay before the public, through the medium of your valuable work, a few hints on a subject

which interests almost every one who reads. In this age of liberality, when not only the mysterious veil is laid aside which schoolmen were formerly so industrious to spread over learning and knowledge, but even the mass of people is courted to improve their minds by every kind of allurements which literary men can invent, to make their productions palatable to all who have money and inclination to purchase them; when booksellers vie with each other in making beautiful and convenient editions of every work that has met with approbation; one remnant of the ancient monopoly remains which has excited my wonder. I mean that by those who make new editions of works, it seems to be expected that all who read them shall be acquainted with the history of the author, and the time in which the book in question was written, and first printed. Without this previous knowledge, how can any one understand the words “two years ago, now, in the last reign, in the beginning of last century,” &c. which occur in almost every book that is read? It is in vain to refer to the title page for explanation in this case; there probably it will be found to be the sixth edition, corrected and amended by ——— 1796. It is true, that frequently a life of the author is prefixed to editions of his work, in which it may be found what time he lived and wrote; but many people have neither leisure nor inclination to read sixty or seventy dull octavo pages for a date, to enable him to understand a single sentence. I recommend to you and your readers, and all booksellers, editors, and all persons who shall print, or cause to be printed, any edition or editions of any book whatever, to insert in the

title page conspicuously the year in which it was first printed; and, if it be a posthumous work, or otherwise necessary, the year in which it was written; and this may be done in the way that shall seem most consistent with elegance and common sense.

By giving this the sanction of your approbation, and printing it in your publication, you will oblige, B.

Correspondence with Dr. James Anderson of Madras.

[Continued from page 224.]

To James Anderson, Esq. P. G.

DEAR SIR,

Tirhoot, May 4, 1797.

THE subscription of this letter may perhaps call to your remembrance a supply of Ankree seed, or tares, from Bengal, through the medium of our friend captain Wilks; and I wish you to be assured, I shall have much pleasure in executing any further commissions you may think of in that way from the province of Behar.

From my public situation I have an opportunity, and will be infinitely indebted to you for supplying me with the means of spreading the cultivation of the Bourbon cotton over this fertile country.

The Zemindars, who bring mares from all quarters to be covered by the horses of government, being now fully convinced of our fairness and liberality, will be very thankful for the smallest quantity of seed, and if you will do me the favour of sending me what you can spare, addressed to the care of Messrs. Cockerell, Trail, and Co. Calcutta, the satisfaction derived from

public spirited, and I doubt not, successful exertion, will be all your own.

W. FRAZER, Captain,
Superintendent of the Stud.

To Captain William Frazer.

DEAR SIR,

Fort St. George, May 29, 1798.

THE Ankree vetch did not come up here, owing, no doubt, to some error in choosing the soil, or season; but, knowing your attention to promote objects of rural economy, I am at a loss to account for my omitting to send you the Bourbon cotton seed.

To make up for this omission in the best manner I am able, above one hundred pounds weight in two bags will be delivered for your distribution to Messrs. Cockerell, Trail, and Co. when the Triton arrives in the river, as Mr. Christopher Smith, who is just come here from Amboyna, has been so good as to take charge of it, and you will allow that it is in very good keeping, when I tell you the zeal, ability, and skill, with which he has executed the commission of transporting the desiderata of the Eastern Islands to various parts of the world, as the following list will shew.

In November 1796 he shipped on the Suffolk, Eliza, Swift, Gloucester, Yarmouth, Ewer, and Fly, two thousand nine hundred plants, consisting of clove, Canaree, Kaiapootie, or Meloleuka Leucodendron, almond of Otaheite, Inocarpus, Edulis, Garcinia Mangostein, and Coesamby, for different places. In the same month and year, he embarked on the Jane, captain Stewart, from Amboyna to Banda, by order

of admiral Rainier, with seven hundred and fifty clove trees, and two hundred and seventy-five sago trees.

In January 1797 he sent two thousand three hundred and sixty-seven nutmeg and clove plants on the *Jane*, to Pulo Penang, Bombay, Madras, and Bengal; and at the same time sent on the *Cartier*, captain Nash, one hundred and fifty-five nutmeg trees, which have been safely delivered at Calcutta. In the same month and year he shipped on board the *Walmer Castle*, captain Bond, for St. Helena, and the royal garden at Kew, two hundred and seventy nutmeg, and two large clove trees; and on board the *Carnatic*, captain Jackson, two hundred and forty-one clove and nutmeg plants, via Canton, for the Cape of Good Hope, St. Helena, and Kew. In February 1797 he shipped on board the *Union*, captain Macaul, one thousand three hundred and sixty-five nutmeg, and one hundred Jamboc-dye trees, which have been delivered at Calcutta. In August 1797 he shipped on board the *Taunton Castle*, captain Stud, for the Cape of Good Hope, two hundred and fifty trees, consisting of nutmeg, clove, Ganemoo, and Lansa: for St. Helena four hundred and seventy-eight, and for Kew garden fifty plants of various sorts. In September 1797 he shipped on the *Intrepid*, captain Selby, two hundred and eight nutmeg, and twenty chocolate trees, for Pulo Penang; as also on the *Hope*, captain Purser, two hundred and ninety-six nutmeg, two hundred clove, one hundred and forty-two sago, one hundred and twenty Java coffee, fifty Ganemoo, fifty Salutry, sixty-five Lansa, thirty-seven Toomy, two hundred Canango, and twenty chocolate plants, for

Pulo Penang and Bengal. In October 1797 he shipped on the *Ganges*, captain Patrickson, four thousand one hundred and two clove, nutmeg, and other plants, for Bengal. On the *Duke of Buccleugh*, captain Wall, seven hundred and twenty plants, consisting of cloves, sago, Kaiapootie, Lanfsa, royal Dammer, Coole Lawa, Toomy-toomy, Cata-Cooty, Ganemoo, Canaree, *Inocarpus Edulis*, nutmegs, and *Epidendrums*. On the *Echo*, captain Catline, for the Cape of Good Hope, two hundred and ninety-seven cloves, two hundred and ninety-two nutmegs and chocolate plants, with one thousand seeds of the Canaree tree. Shipped on board the *Bellona*, captain Ferror, one thousand three hundred and twenty-eight plants, consisting of five hundred and twenty-three nutmeg, four hundred and eighty-nine clove, and three hundred and eighteen various kinds for St. Helena, Kew, and the West Indies; and on board the *Phoenix*, captain Moore, he shipped for Bencoolen, one thousand and four nutmegs, and five hundred and eighty-one clove trees. In January 1798 he shipped on board the *Union* (the second time) captain Sparram, two thousand nine hundred and seventy-eight plants of cloves, nutmeg, and other valuable plants of the Spice Islands for Pulo Penang, Madras, and Bengal. He has now brought here with him, on board the *Triton*, captain Wright, thirty-three thousand four hundred and forty-eight nutmeg, two thousand seven hundred and sixty-three cloves, and other trees, and eight hundred and twenty-four chocolate plants; of these, a portion will be left here for the Tinnevelly, Baramahl, and Dindigul district, and the Malabar coast, the rest he will carry with him to Bengal.

These plants on the Triton, although brought from so great a distance, are all in perfect health, so much so, that one of the nutmeg trees, which is fourteen feet high, has fruit growing upon it; and, as many persons may be desirous of promoting their establishment in Hindostan, I will observe that Mr. Smith says, the surface of the islands is undulated, and both nutmegs and cloves grow in all situations, regard being only had to break the force of high winds by the neighbourhood of clumps of other trees. The earth in which he has brought the plants is a friable rich garden mould: the atmosphere being moister there than here, points to the use of shading the young plants in the day-time, and sprinkling the leaves from a watering pot at night.

All the other trees are also valuable; the Cancree produces a nut equal in size and sweetness to the almond, which supplies the place of bread to the natives, as well as sago; from the leaves of the Caiapootee is obtained an oil, used as a remedy for sprains, bruises, and rheumatism; the Lanfsa is a delicious fruit; the wood of the Ganemoo is so strong a cordage, that the best fishing nets are made of it, and the leaves, when boiled, make delicate greens, equal in flavour to spinach; the young and tender fruit is excellent in currys; the royal Dammar yields a rosin used for lights, and paying the bottom of vessels; the Cooly-Lawa yields an essential oil of sassafras; the Toomy-toomy bears a fruit like the Morella cherry; the Cata Cooty bears a delicate fruit in clusters like the currant.

JAMES ANDERSON.

From the above letter the world will be able to form some idea of the amazing spirit of exertion that has been excited in India through the mediation of Dr. Anderson; and, while it exhibits under a very favourable point of view the persons in power who have favoured these exertions, it reflects still greater honour upon the person whose energy first put it in motion. It affords a pleasing proof of the great good that may be done by a single individual in his private station, when his exertions are directed by benevolence, and conducted with steadiness and intelligent perseverance, uncontaminated by selfish views, and party considerations. Had any person taken upon him to say before it had been done, that it was possible a single individual could, in the course of two years, prepare and ship off 58,411 rooted trees, and send them by sea all in fine condition to various distant settlements, no one would have believed it. I am happy in being able to lay before the public such authentic documents of a fact so very surprising, and which will excite the admiration, and ought to insure the grateful commemoration of many succeeding ages.

Though it is by no means the intention of the Editor to burthen this work with the charge of expensive engravings; yet, as he had an engraving of his friend that was done for another work, which, though executed by a young artist in a rude manner, exhibits, as he is told, a very striking likeness, he thought it might prove agreeable to many of his readers to obtain some idea of the features of a man in whom they must naturally take a deep interest; from which considerations a copy from that print will be given along with this number. It may be proper to add, for the satisfaction of others who are curious in regard to portraits of eminent men, that the late Mr. Tassie executed a very excellent head of him under the correction of Mr. Smart, and other friends of Dr. Anderson who have come lately from India, which was among the last performances of that eminent artist, and is esteemed an excellent likeness; which may be seen at young Mr. Tassie's, Leicester Square.

To the Editor of Recreations in Agriculture, &c.

SIR,

IF you shall think as well of the enclosed little poem as I do, you will give it an early place in your miscellany. It is the performance of one who is known and much esteemed by the public, and never has yet been published. It is of no consequence how it came into my possession; all that it is necessary for you to know is, that you may rest assured you never will incur any blame for publishing it.

A—S.

THE HARPER.

*A mother playing on the harp, an infant in the cradle,
the father and grandfather standing by.*

I.

WHY, have I asked, do painters give
Each muse and grace the female charm?
Mean they to make a goddess live?—
Or rather, mortal hearts to warm?

II.

And, why do realms of heav'nly light
With golden harps so sweetly sound?
Those realms are regions pure and bright;
Such music suits celestial ground.

III.

Fair harper, o'er that various lyre
Still let thy fingers lightly move;
So shall this bosom glow with fire;
So melt with pity, or with love.

IV.

From notes so sweet, from face so fair,
How shall my thoughts to heav'n ascend?
Ah! me, so frail my passions are,
Still, still to earth this heart must tend.

V.

But thou, sweet babe, art sunk in rest,
Unheedful of that charming strain:
Insensate is thy little breast,
Alike to pleasure, as to pain.

VI.

Nor dost thou heed thy father's smile;
Nor watch thy grandsire's wistful eyes.
Sleep on, blest infant!—yet awhile,
And thou shalt glow with kindred ties.

VII.

Soon from thy father shalt thou learn
To raise the heart that droops with woe:
For Freedom, like thy grandsire, burn,
With sacred love of country glow;

VIII.

Soon shalt reflect thy mother's face,
Attune her harp, and catch her eyes;
And, drest in every female charm,
Appear some angel from the skies.

Index Indicatorius.

THE very polite and obliging letter signed *D. D.* has been received. The singular modesty of this writer gives a happy presage of the merit of his performances. Nothing can be more consistent with the plan of this work, nor more agreeable to the wishes of the Editor, than such remarks on any of the classics as shall be dictated by a feeling mind which is nicely susceptible of beauties that will ever render these writings dear to those of a superior taste and cultivated mind: but he ought never to forget that his wishes, in this respect, must be only sparingly indulged, as his work is calculated for the amusement of many who could

not be supposed to take much pleasure in that kind of reading. Just observations on matters of taste, however, will seldom prove disagreeable to any liberal mind, if they be not of too great length, and are accompanied with as few (untranslated) quotations as circumstances will admit.

Few young writers seem to be sufficiently aware of the benefits they might derive from occasionally translating classical writers of different nations. Every language possesses some advantages peculiar to itself, while it has at the same time various imperfections to which those others are not liable; but, as habit reconciles us to whatever has been familiar to us from our infancy, it seldom happens that a person who uses only one language can ever have an adequate knowledge either of its excellencies or defects. An Englishman, for instance, is not sensible of any incongruity when he makes use of the expression *man-midwife*; but were a Frenchman to hear it for the first time, the striking incongruity of the phrase would have a powerful tendency to excite his risible faculties; and he would at once recognise the superiority of his own language in this particular. On the other hand, the Frenchman would be not a little surprised, should he see an Englishman smile on hearing him gravely tell that such a person was *monté à cheval sur un asne*, for he is sensible of no incongruity of expression here, though to an Englishman it appears very absurd to say that such a one *was mounted on horseback upon an ass*. In like manner it is easy in English to say that a servant may be as happy as a king, leaving the proposition general, and without

limiting it to servants of one sex more than the other; but a Frenchman would find great difficulty in translating that phrase neatly, because there is no indefinite word in that language for servants: it must limit the proposition either to male or female servants, or both must be repeated by name. In this way does an attempt at translation of any kind oblige a young writer to feel the excellencies and defects of his own language much more forcibly than he otherwise could have done, and thus prepares him to be able to avail himself of the one, and to avoid the other.

If the young person has an ardent mind and vigorous perceptive faculties, the kind of embarrassment he thus feels will call forth all his powers to surmount this difficulty. He has felt the force of the original, and a translation where that beauty is lost will appear to him intolerable. He casts about to try if he can evade it. He soon finds that, in poetry especially, where so much depends upon the *curiosa felicitas* of expression, it is impossible to produce any thing like a similar effect by adhering to the expression of the original; for what was sublime in the original would often become extremely ludicrous in the copy. Abandoning the particular expression therefore, he strives to imprint the idea strongly on his mind, and then endeavours to produce a similar impression by using such words as are best calculated for this purpose in his own language. Thus is he, as it were, compelled to bring forward something good, if the original he has chosen be excellent; whereas, if he had been left to himself, it is ten to one but he might have remained satisfied with a lesser

degree of excellence. A person of inferior talents, who never feels the power of the original, is incapable of being induced to make the same exertions. Among this class of persons nothing is so common as to find them complaining of the insufficiency of the language in which they write; and I am sorry to be obliged to add, that in modern times many men of even superior talents, drawn away by the prejudices they have imbibed from their teachers before they were able to judge for themselves, have not been ashamed to join these insignificant beings in their senseless clamour. The truth is, that the same rule holds good in regard to language as to arts. It is so universally known, that a bad artist never meets with a good tool, that it has become a proverb even among the most undiscerning of the people. It is equally true, that a feeble mind never yet could meet with a native language that was good for any thing. Those languages which had been employed before his time, or by other nations, have always great beauties in his opinion; but his own is poor, and totally incapable of attaining to any degree of excellence. This has been the language held out by puny writers from the beginning of time; yet it so has, unluckily for them happened, that from time to time some one has started up, who, merely by the superior powers of his own mind, and frequently without any co-operating aids, has shewed at once that the endless complaints of these croakers is unfounded; and that the tool is most excellent, if a dexterous hand only could be found to use it. It was thus Petrarch rescued the Italian language from that obloquy under which it had laboured

for so many ages before his time. It was thus Cervantes unveiled the powers of the Castilian tongue to his astonished countrymen. It was thus that Shakespear and Milton displayed the unrivalled powers of a language which, till then, had been deemed only a chaos of barbarisms; and which, in spite of their bright example, has been stigmatised as barbarous by pedants of later times, who, without understanding its principles, have pretended to explain them. It was thus that Voltaire first showed that the French language, to the astonishment of many, was susceptible in prose, of energy, vivacity, and grace; and Racine exemplified that even in verse, under the powers of genius and taste, it was not incapable of being rendered flowing, melodious, pathetic, and, in some few instances, even sublime. But it was reserved for Rousseau to show that the same language was susceptible of ease and grace, sublimity and pathos, in prose. From these, and many other examples that might be produced, it is sufficiently obvious that if any of our writings are tame, fantastic, affected, or puerile, the fault is not to be attributed to the language, but to the deficiencies of the person who uses it. It is the energy of the mind which forms the basis of style, and not the words that enter into the composition. The same words are to be found in the tamest writers of the present day, as in Hume the historian; and they are employed by them with much greater grammatical accuracy than by him: but what writer in modern times can be compared with him for clear, distinct, and unaffected energy of expression? Who was ever at a loss to understand the meaning of any sentence that ever dropped from his pen in the sense he

meant it should be understood? And who but him could conduct a narrative in such a seemingly simple manner as that the road was apparently plain and easy, while he was leading his reader all the while through intricate mazes that would have bewildered another, without allowing a single glimpse of these intricacies to be seen? Who, in short, but him could so artfully blindfold those who put themselves under his direction, as to make them believe that they saw objects clearly before them, while they were in fact often walking in the dark? Such was the power of our language under his hands, without ever having recourse to the shift of either elevating it upon Latin stilts, or confounding it with the indefinite galemathias of gallic circumlocution.

It is to the operations of the mind, then, that a young writer ought to direct his chief attention. It was the peculiar train of ideas of Tacitus which formed his nervous style; for this was not *affectedly* abrupt, like the writings of Montesquieu. It was the excursive mind of Cicero which led him into those flowing expansions which abound in all his works. The compositions of Cæsar, Sallust, and every other writer in the Augustan age, owed their respective peculiarities to the same cause. The language in which they all wrote was the same, yet how different does it appear to be under the management of each of them? They are all however, as well as the classics of Greece which have come down to us, excellent in their kind; for the trash that was written in those days has long ago sunk into its merited oblivion. On this account they are much fitter studies for composition than those of more doubtful celebrity of modern times. The ideas

of these writers are clear and discriminative, and their expressions are forcible and appropriate. He therefore who tries to make a translation of any of their writings into his own language, must first clearly comprehend their ideas; and, if he is once capable of doing this, he never will be satisfied with his own version until he finds that it is capable of exciting similar ideas: nor will he find that this can be done until he makes himself acquainted, not with the words alone, but with the true idiom, the spirit, and the energies of his native tongue. It is not every one, it is true, who is fitted to become a great writer; but many a man, who has natural powers for that purpose, never acquires the faculty of exerting them, in consequence of having adopted improper ideas at his first outset in life. Thus, instead of exercising the powers of the mind on great and interesting objects, they enervate it by directing their attention to syllables and sounds as primary objects; and they are so perpetually employed about filing and polishing the lesser members, that they lose at last the power of constructing the rough but solid basis upon which the stability of the whole depends. The world is thus inundated with a multiplicity of books that consist, for the most part, of words, and nothing else; of words, it is true, that are polished like a set of courtiers in a drawing-room, dressed out in the nicest order, without having one hair to be seen out of its place, where they utter nothings for whole days together. For my own part, I should like much better to mingle with a set of hardy freeholders, in a plain though decent dress, in the house of commons, who there engage, without unnecessary refinements, in those interesting discussions

which tend to preserve order, vigour, and industry in the state.

For these reasons I cannot but highly approve of the manner in which my amiable correspondent conducts his studies; and shall think myself honoured if this miscellany shall be made the vehicle of communicating to the world occasionally such translations from, or observations on the classics, as a chastened judgment shall suggest, and a polished taste approve.

Cuckniensis transmits a *recipe* for freeing sheep from the tick, which the Editor is far from recommending for general use, even though its efficacy were incontestibly established. It is a solution of arsenic in water. This drug is too powerful and too dangerous as a poison ever to be intrusted into the hands of such persons as would have the charge of it in this case. From ignorance or carelessness many accidents might be expected to originate from this source, of a much more serious nature than the evil it was intended to remove. The person who furnishes the *recipe* even lays the foundation for unnecessary danger, by advising the use of a super-saturated solution; that is to say, as cold water can dissolve only a certain proportion of this salt, and hot water a much larger proportion of it, he advises that, in order to obtain a very strong solution, the water should be employed as hot as the skin can bear it, and in this state be fully saturated. The necessary consequence of this practice would be, that no sooner was the animal dipped and exposed to the air, than the water in its fleece would begin to cool, and of course deposit a part of the arsenic in the fleece; if any part of the water evaporated from the body without dripping down, a farther

portion of that virulent poison would be there deposited, where it must remain in its full activity, liable to be washed out by succeeding rains, from which it could not be entirely dislodged perhaps for years together, could the fleece be kept upon it so long; during all which time it is not only liable to operate on the sheep itself, or its companions, as a poison, should any of that matter, by adhering to the lips or otherwise, be swallowed; but it might also produce its effects upon human beings unobserved or unsuspected, in consequence of adhering to the hands of persons employed among the wool, or dripping while wet with rain upon something where no such poison could be expected. For these, and other reasons that might be added, I cannot but in the strongest terms disapprove of that proposed remedy, even if none other could be found that were efficacious; but since it is well known that the disease will be effectually removed by dipping the animal in a decoction of the stalks or other parts of *tobacco*, it becomes unnecessary to have recourse at all to such a dangerous application. The Editor returns his thanks, however, to this correspondent for his obliging attention, and will always pay due respect to every thing that comes from the same quarter.

The Editor regrets that the respect he wishes to pay to all his correspondents should have induced him to mention the proposals that some of them have made for altering his plan; for this has brought forward a number of proposals from different quarters, under the signatures *Fidelis*, *A true Friend*, *Trueman*, *Ara-trophilus*, and many others; some of them recommending that the department of agriculture be aug-

mented, to the exclusion, in a great measure, of miscellaneous matter; others wishing it to be curtailed, to give greater space for natural-history; some complain of the small quantity of poetry, and the Belles Lettres, while others would totally proscribe every thing of that nature: in short, the advices are so contradictory to each other, that it would afford some amusement were they all to be published verbatim, merely to point out the impossibility of complying with them. Under these circumstances there seems to be no other course left for the Editor to steer than that of adhering, as rigidly as he can, to the plan indicated in his prospectus: as no one will thus have reason to complain of being *deceived*, at least in regard to this particular, however different that plan may be to what would have pleased them better. From this time forward, then, he hopes his correspondents will not consider it as disrespectful, if in future no farther notice be taken of all such letters as run upon that topic, than barely to announce the receipt of them; for this would greatly enlarge the bounds of a very useless and unsatisfactory correspondence. It is by no means meant, however, that this rule should be extended to those notices which respect the *merit* or the *demerit* of any of the essays, considered individually, that shall seem to deserve animadversion by the reader.

An ingenious correspondent, after some obliging remarks, recommends the following mode of preparing potatoes to the notice of the public, as being, in some respects, better than any other he has seen.

“ Slice and cut into squares” [Qu. Would not thin slices do better?—Editor.] “ from one-third to one-fourth of an inch each, inferior potatoes; put them into

a solution of salt and water for a short time, drain them in sieves, then spread them on the bottom of a moderate hot oven three or four inches thick, stir or turn them after ten, fifteen, or twenty minutes, with a rake or other instrument, and when done of a brown colour on different sides, take them out and replace them with more, by which means a large quantity of valuable food may be prepared, the salt making it more agreeable and nutritive for horses or other animals; and by mixing it with oats, beans, or barley, ground or unground, the consumption of those articles may be lessened." He adds, "If it meets your approbation, and the high price of grain continues, I can send a substitute for bread, which only requires half the usual quantity of wheat flour; and, as a lover of agriculture, may, perhaps, send a few observations thereon."—It is hardly necessary to say, that any observations that shall have a tendency to benefit the public, or to alleviate particular distress, will obtain a marked attention from the Editor.

Communications from *H. G. H.—R.—Alfred*, and several others, are received, and will be noticed hereafter.

Some of our readers will be glad to be informed, that the publication of the Lectures on Agriculture by Dr. Cullen has been prevented.

✍ It is much to be regretted that no mode has yet been proposed to put a stop to the rapid and immoderate rise in the price of Paper within these three months; nor can we say that it will even here become stationary. There is reason to suspect that no inconsiderable part of this rise is artificial: at any rate, it is a matter of so much consequence as to demand a very serious investigation by the legislature when parliament shall meet; and we anxiously wish and hope it will then obtain it. The editor of this work, from a grateful sense of the favour with which it has been received by the public, whatever may be the case with others, will make no alteration in the price during the currency of the present volume: when it ends, he must act as circumstances shall direct.

RECREATIONS, &c.

N^o 11.

AGRICULTURE.

Hints respecting the circumstances that require to be chiefly adverted to in experimental agriculture, particularly with a view to a proposal for instituting a national experimental farm.

[Continued from page 252.]

OF THE VARIETIES OF THE GOAT KIND.

THE goat is very nearly allied to the sheep in its general characteristics, so that by some it has been accounted a variety only, and not a distinct species; but, as no mixed breed produced between these two is as yet known (though this I am sensible has been often asserted by hasty observers to quadrate with their own theories), it must for the present be ranked as a distinct species of animals.

As the flesh of the goat is not in general in such high estimation as that of the sheep, nor the fleece of the common race of goats so valuable, it has not obtained nearly the same attention from man; and as this animal is now very little reared in any part of this island, a very few observations will be sufficient under this head.

The varieties of goat we shall find exhibit a much nearer approach to the same appearances with the sheep in regard to the *fleece* than has been generally suspected. There is in this island two varieties nearly equally common, viz. a kind with short stiff hair, exactly resembling, in this respect, the Madagascar and other congenial breeds of sheep (the colour of this kind is often black); and a kind bearing long rough shaggy coarse hair, usually of a grey colour, or mottled, the skins of which are chiefly employed for making soldiers knapsacks. This variety is very nearly analogous to the Argali, or wild sheep of Pallas; not only in respect to the long shaggy hair common to both, but also with regard to the *fine* wool which grows at the roots of that hair; that substance being equally soft and fine on the common goat as the Argali. This is a curious fact which has been long unknown to the inhabitants of Britain, in the same manner as the *wool* of the Jamaica sheep has hitherto escaped the notice of the inhabitants of that island. The fact, however, has been long known to the natives of Russia, among whom very soft wool, which always makes a warm clothing, is an article of higher luxury than with us. On this account, the natives there having remarked this singularly fine wool produced by their goats, have long been in the practice of separating that wool from the hair, and making of it gloves, nightcaps, and stockings, on which they set a very high value. The first specimen of this kind of wool I ever saw was sent to me by a Russian lady, with a request that I would try to get it manufactured into shawls for her. The quantity (not much above

a pound unsorted), was too small to admit of being made into a web by itself; the chain was therefore made of silk, and the *woof* of fine yarn made from that wool. The fabric was the softest of any thing I have ever seen. It was compared with the finest shawls that come from India; and, notwithstanding the hardness of the silk chain (the wool being infinitely softer than that substance), it was decidedly softer than the finest Indian shawls. I had three shawls of a full size, and one waistcoat made of it, which were exceedingly admired. The colour was a dull white, with a delicate, scarce perceptible, glance of red through it; and when put round a lady's shoulders, it was so very becoming, at the same time it made the linens appear so pure, that no one who ever was permitted to try it on ever quitted it without a very sensible regret; and had I had a hundred of them for sale, I make no doubt but I could have got twenty guineas a piece for the whole. They were, however, not mine; and being sent to the owner in Russia, they were deemed a proper present for the Empress, who greatly admired them; and in the Imperial wardrobe they probably are at this moment. After this I examined many of the long-haired goats in this country, where I found the very same substance. In some cases the quantity was very considerable, and in others much smaller, but it was not wholly wanting in any of those I have as yet examined. To obtain this wool, the practice in Russia is to have their goats first well washed towards the beginning of summer, and after the fleece is dry, it is combed, first with a wide-toothed comb, and then by others closer set,

which tear out the fine wool, while the hair remains fixed to the skin; any hairs that may be accidentally blended with it are then picked out, and it is ready for being manufactured. I could not learn what quantity might be thus obtained from a single fleece; but imagine it must be so small as not to admit of its being separated with a view to profit in manufactures in a country like this, where manual labour of all kinds is so high. The fact, however, is incontestibly proved, that some varieties of the goat tribe do actually produce wool of perhaps a finer quality than that which is yielded by any sheep.

The Angora goat is another variety whose fine silky fleece may be produced as a parallel to the glossy hair and valuable furs of the Tcherkefsian, Bucharian, and Crimean breeds of sheep, which have for ages past furnished gorgeous robes to the wealthy inhabitants of the northern and eastern parts of Asia. The wool of the Angora goat is of great length, fine, soft, and silky; and bears a very brilliant gloss. It has long been sold at a high price, as an indispensable ingredient in fine camlets and bombazines, so that it forms a considerable article of import from the Levant into this island. In conformity with the philosophical theory of the over-ruling influence of climate on the wool of animals animadverted on above, it was long deemed a vain attempt to try to import that animal into this country, with a view to see if the valuable fleece could be reared here, as it was considered to be a perfect certainty that the climate of this country would convert this fine hair, in a short time, into the coarse hair of our common goat. At length, however, a

spirited individual, Mr. Eccleston of , in Lancashire, ventured to import some individuals of that variety of goat. He finds they thrive as well as he could wish, and breed freely in Lancashire; nor can I learn that he perceives the smallest variation in the fineness or other peculiarities of the fleece from the first moment they were introduced into this island, now a good many years. It happened about four years ago, that one of the old goats was by accident drowned in one of those broad deep ditches he employs as fences; he had the skin of it taken off, and sent it to a furrier in London to have it dressed. The furrier, when he received it, wrote to him, desiring to know if he was inclined to sell it; and if so, he offered to give him *six guineas* for the skin, and the same price for as many more of the same sort as he could spare. This fact I had from Mr. Eccleston himself, when he sent me a specimen of its hair, so that it cannot be doubted. If nearly this price could be got for the skins, and if the meat should be found of a nourishing quality (and we know that goat flesh and kid are preferred to sheep mutton and lamb in the south of France, and other warm climates), the meat on account of the value of the fleece, could afford to be sold so cheap, as to be of great use to the poor in this country. But nothing can be said at present on this head with certainty. Were it necessary to add anything to corroborate the fact respecting the practicability of rearing this variety of the goat in Britain, I might mention that an enterprising individual in Sweden imported into that country, about forty years ago, some individuals of that breed, which have been kept

there ever since, and have been increased considerably without being found to have degenerated in any sensible degree.

It has been often asserted, that the shawls which come from Bengal are manufactured from the wool of another variety of the goat tribe which is found on the mountains of Thibet, and is there called *Toux*: but this fact is by no means sufficiently established as yet, some persons asserting it is the wool of a sheep. However this may be, certain individuals of the goat kind have been brought from India to Britain under the name of the Thibet shawl goat. Two of these I have seen and examined; nor have I the smallest doubt that this has been put upon us as a trick to try the stretch of our credulity. These goats seem to be an intermediate (mongrel) breed between the common long-haired goat common to Europe, and the Angora goat. The hair is not so coarse nor so shaggy as that of the European goat; nor is it so fine, so long, or so silky, as that of Angora. Like the last, its colour is white; but less brilliant and glossy. There is found at the roots of the hair some fine wool, like that among the long-haired European goat; but that wool, in the specimens I saw, was in much smaller proportions than in the common goat with us. All the males that were sent were castrated, which doubtless indicates a most shameful degree of inattention in the persons who sent them *so far* for the sake of the breed; yet from this circumstance we may conclude that this must be a goat very generally used for food in the country, the skin being apparently unfit for any other purpose than those uses to which we employ

the common goat skins in Europe. I have not as yet found any variety of the goat which carries a full fleece of wool without any hair among it, like some of the breeds of European sheep.

That there are varieties of goats which may be discriminated from each other by peculiarities not connected with the fleece, there seems no reason to doubt. The milk of the goat is, in some situations, perhaps its most valuable product, especially at sea, where that animal thrives better than any other creature yielding milk that we know. In regard to this particular, there is a considerable diversity in the different breeds. The short haired kind is almost universally preferred to the shaggy sort in this country; but I have been assured, from an authority I cannot doubt, that there is found on the mountains of Strella, in the province of Beira in Portugal, a breed of goats which far excel, in this respect, any that are reared in this country: it being no uncommon thing for a goat of that breed to yield a full English gallon of milk per day; which, for an animal of that size (not much larger than the common goat), is a surprising quantity. It would be very easy for our ship masters who trade to Oporto to bring over a breed of these goats, which, if upon accurate trial they should be found to stand the test, would prove a great acquisition to this trading nation; for the goat on ship-board eats almost any sort of refuse thing, and is therefore kept at no expence; and could be made to afford a constant supply, not only of a delicious morsel to the luxurious, but a powerful medicine for the sick, of which they must otherwise be deprived.

I shall not extend this article farther than barely to take notice of one other variety of the goat that has not acquired a definitive name that I know of, though it is doubtless the most remarkable of all the class; it may perhaps be called *Capra gigantea*. This animal, from the description given of it to me by Dr. Walker, professor of natural-history in Edinburgh, is equal in stature to a full sized horse; and is of amazing strength, agility, and swiftness. A flock of these were first observed in one of the inland provinces of Hindostan by a body of British troops, and excited no small alarm in the whole corps. The herd of goats no sooner perceived the body of men advancing, than they lifted up their heads,—ran off for a small distance,—then wheeled about, seemingly to reconnoitre; and, advancing in a body as if to attack, had such a formidable and warlike appearance, and withal of a kind so totally new, that no person could form an idea what it might mean. Their horns, at least two feet long (I have seen a pair of these, now in the museum of the professor of natural-history of Edinburgh), rose to a great height in the air, and did not permit the troops to see distinctly whether men were mounted on the animals or not; but in a short time they took once more to flight, and totally disappeared.

These are the whole particulars I have been able to learn of this variety of the goat kind. They are enough to show that it is totally distinct from any other yet known; and, as it is by no means certain that this animal might not admit of being employed as a beast of burthen that would be far preferable, in

some respects, to any we as yet possess, it ought strongly to excite the attention of agricultural improvers. If it possesses the nimbleness and surefootedness with the persevering exertions of the goat, superadded to the weight and strength of the horse; if it also yields milk of as valuable a quality as the cow, and flesh equally nourishing with the ox, it would be far more valuable as a domestic animal for draught than any that are yet known; especially in the West Indies and other warm climates, even although its fleece should neither be so fine as that of the Angora goat, nor its wool to be compared with the shawl wool. The probability of these things being so is such as sufficiently to vindicate an attempt to investigate this subject, with a view to ascertain the facts respecting it with precision; and I shall take it as a very particular favour if any of my readers in India who shall have opportunities will be so very obliging as to send to me as authentic an account as they can collect of this singular goat, especially in respect to its size. I understand that this kind of goat was discovered on the banks of the Ganges, high up the country, above Plafsy.

[*To be continued.*]

A description of an improved mode of Horse-hoeing.

THE Editor being some time ago in company with several persons of rank, who take a pleasure in rural pursuits, he chanced to mention, when the subject of horse-hoeing was introduced, that he had accustomed himself to perform that very important operation with-

out the aid of any other implement than the common swing plough; and that he found it could not only be thus performed, but could be executed in a much more complete and husband-like manner than ever he had seen done by the hoe plough. One gentleman present having insinuated a doubt of the possibility of *properly* hoeing a field by means of the common plough only, the Editor said that this doubt could only have arisen from the circumstance of the gentleman's not having sufficiently adverted to the powers of that implement; and that it would be very easy to satisfy him *practically*, not only of the possibility, but also of the eligibility of that method preferably to others. The president of the Board of Agriculture, in whose house this conversation took place, having expressed a wish to be informed of the way in which it could be done, the Editor observed, that an abstract illustration would lead to greater length and intricacy than would suit the occasion, on which account he begged leave at that time to decline it; but said he would take an early opportunity of doing it in a more suitable manner. The following paper was written for the purpose of satisfying his lordship in regard to this particular: and, as the information it contains may prove acceptable to many of the readers of this miscellany, it has been judged proper to take this mode of communicating it to the public.

The operation of horse-hoeing, as practised by Tull, Chateauvieux, and others, appeared to me, from the time I saw it first performed, to be an imperfect operation, which very much needed to be amended.

The imperfections were, in the first place, that when the earth is turned away from the row of plants, by opening a furrow on each side of that row, and laying it towards the interval, the roots of the plants being left naked on both sides at the same time, and the ridgelet on which they stand being thus left exposed to the drying summer winds, the plants are liable to suffer a considerable check, and must, of necessity, be greatly damaged by it, unless precautions be adopted to guard against such injury; which greatly tends to frustrate the beneficial effects of this operation. These precautions are, first, not to go nearly so close to the row on either side as might otherwise be safely done, but so as still to leave a considerable quantity of earth for the roots to bed in: secondly, not to go nearly so deep in performing that operation as might otherwise be safely done; because the small ridgelet, when a furrow is open at the opposite side of it, could not oppose such a resistance to the left-hand side of the plough as to enable it to move out of its place the fast earth which requires to be turned up by the right-hand side of the plough: and thirdly, that, instead of being able to make the plough go *perpendicularly* downward, very near to the row, it must be so conducted as to make the cut slanting outward at the bottom; otherwise the earth would moulder down from the top, and leave the roots of the plants bare. From a combination of all these particulars it necessarily follows, that a very large proportion of the soil must be left near where the plants grow that never can be touched by the plough, and of course can receive no benefit whatever from the hoeing.

In the second place, when the earth is to be turned back toward the rows, we must suppose that a plough with a double mould-board is made to go right down the middle between the rows, so as to split the ridgelet in two, laying a part towards each row; which is the best and the cheapest way wherein this operation has been hitherto performed. By this method the loose earth which was formerly turned from the row is now turned back towards it, and a part of the solid earth which was in the middle is also lifted up out of its place, and is thrown toward each row. Every succeeding hoeing is only a repetition of these two steps of the process, so that it is unnecessary to repeat them here. To show the effect of these operations, the two diagrams in the margin are annexed. See p. 347.

In both these the lines *A B*, *A B* represent the surface of a plowed field, and *C D*, *C D* the bottom of the plowed part of the field, which is here represented as being six inches in depth; this being the whole of the bed in which the plants are to find their nourishment. Let *E F* represent two rows of plants intended to be horse-hoed, that are placed here at three feet apart. At the first operation the plough makes the furrow *b c e* Fig. 1, turning the earth from the row of plants *E*; and returning on the other side of the row makes the furrow *a d A*, leaving the row of plants *E* standing upon the eminence *d a b e*. The same operation being performed on the row *F*, it is left as in the diagram; and so through the whole field. The furrows in this case are represented as going to the depth of three inches, which it is supposed will be admitted to be a fair average of what is actually done in practice;

and the distance $a b$ is nine inches, which is also as little as can with safety be made in cases of this kind. The reader can, by bare inspection, perceive at one glance, what a very small proportion of the mould is stirred by that operation; and of course how imperfectly it answers the purpose intended. Had an attempt been made to approach nearer to the row E on each side, and to go perpendicularly downward, and so deep as to reach the bottom of the manured soil, as is represented by the dotted lines $f h i$ and $g k l$, it is evident that the small pillar of loose earth $f h g k$, when deprived of all support on the opposite side, could never have resisted the pressure of the plough while it forced out the earth in the opposite furrow; nor could it have stood in this position, nor retained moisture to preserve the plants alive.

Fig. 2 represents the same field as it is left after the second operation, in which the furrow made by the double mould-board plough is represented as four inches deep (being eight inches perpendicular from the surface of the raised up earth). It is needless to multiply words to show how little of the mould can be actually removed by these operations, let them be repeated ever so often; the bare inspection of the figure shows it in the most perfect manner. Even allowing that the succeeding operation should go an inch deeper than the first, the case will be very little altered. More than three-fourths of the vegetable mould must remain untouched by these very superficial and deceptive operations.

It was with a view to obviate such radical defects that I was induced to lay aside these implements,

and to perform the operations by means of a common plough; the manner of doing which I now proceed to explain.

Let Fig. 3 represent the same field as before, with the rows of plants E F growing upon it. Instead of beginning the first hoeing, as before, by running the plough along the right hand side of the row E, you must now go along the left-hand side of it, so as to lay the earth toward that row, as at *a b c*. Having performed this operation on the left hand side of the row E, and supposing, for example, the plough to have been brought back to the same end of the field from which it proceeded at first (without inquiring now how that is to be done), you are to suppose that it begins between the rows E and F, by drawing the furrow marked *d e f* (the space between *d* and *g* being presumed to be at this time solid mould), so as to turn the earth toward the row F. Then (the plough being again brought back to the same end as at first) draw the furrow *h i k*, which, by having had an open furrow to the right hand side of it, can be with ease made deeper than the former. Then, by going a third time in the same direction, you draw the furrow *g l m*; going in this case as close to the row as you please, as the solid earth on the back of it prevents it from being deranged. For the same reason, and also because the whole of the fibres on the left hand side of the plant are in this case left entire, it is in no danger of suffering by having the roots on this side cut very near; and there being plenty of mould on that side to prevent it from suffering by the drought, the operator is at liberty to go much closer to the row

than could be done in the usual mode of hoeing,—to cut much straighter downwards, and also to go much deeper than in the other case. In this way the whole of the earth may be stirred, even to the very bottom of the furrow if you so choose it. When the operator wishes to go deep, he will naturally take a furrow of a smaller breadth, so as to proportion the weight of the furrow to the strength he can apply to turn it. In this way it is obvious, that by this first operation a much greater proportion of the mould is turned over than by the common process, as in Fig. 1; the black in both cases representing the part of the mould that is left untouched. Let us now see what takes place in the second hoeing.

Fig. 4 is intended to represent the field after it has undergone the second hoeing; in which, as in all the other diagrams, the dark parts represent the mould that has been left untouched. In performing this operation, you are to suppose that all the steps of the last hoeing are directly reversed. That is to say, instead of beginning at the back of the row E, and turning the furrow towards it, the plough begins on the right-hand side of the row F, and going now in an opposite direction to what it formerly took, it of course now turns the furrow towards the row F. That being done, you are to suppose that, still holding the same direction, it is made to pass between the rows F and E, so as to open the furrow *n o p* (the dotted line *q r n* representing the open furrow that was left in the first hoeing). A second furrow is then drawn in the same direction, so as to form the opening *s t u* (the dotted line *n s x* representing the surface of the

mould as left at the last hoeing); and a third furrow, drawn in the same direction, leaves the opening $x y z$; in which situation it remains till the third hoeing commences. Proceed after the same manner till the whole field be finished.

Every succeeding hoeing is directly the reverse of this, and ought to differ from it in no other respect, unless it be that at each succeeding hoeing care should be taken not to go quite so close to the row of plants as in the former hoeing, but leaving a space of two or three inches more of mould for the roots to grow in undisturbed; thus will the large roots be suffered to remain untouched, while small fibres only will be cut off, and thus the absorbent mouths be greatly multiplied; while they are furnished with the best prepared mould in which they can freely strike, so as to furnish the plants with the greatest quantity of nourishment that the nature of the soil can possibly supply. The furrow likewise may then be made so deep as to reach the bottom of the manured mould in all cases. Thus every inch of the mould, except perhaps the small bit $q t w r$ under each row, will receive nearly as complete and thorough a summer fallow as if no plant whatever had grown upon the ground. Let this be compared with the case Fig 2, and the difference between the merits of these two operations will be made obvious.

In consequence of this perfect kind of hoeing, the plants will advance with a degree of vigour that can never be attained under any other circumstances. The ground will be kept continually moist, so that in the driest season ever experienced in this climate their

leaves will exhibit the most healthy verdure, and extend to such a length, in turnips and cabbages especially, as quickly to close upon each other, and in a short time leave no appearance of the rows. To prepare for this, the operations must be hastened, so as to put the soil into the finest possible tilth before the hoeing be finally closed; after which time the roots must be left at full liberty to spread with freedom in the fine mould that had been prepared for them, and the plants will thus be made to attain the utmost degree of perfection of which they are susceptible. It now only remains for me to show in what manner the last operation is to be performed, so as to leave the plants in a proper state.

Let us suppose, then, that it is a field of cabbages; there is no necessity for discontinuing the hoeing until the leaves nearly meet each other in the middle between the rows; for a well-trained horse who has been accustomed to this work, will walk in the interval without being in the least discomposed by it, and without doing the smallest hurt to the cabbages while the leaves are in this state; for, although these will brush close along the sides of the horse, yet they will yield to that pressure, and resume their former position when he is past, as if nothing had happened to them; the horse's feet moving with freedom underneath the leaves.

Let us suppose farther, that at the last hoeing the field had been left as represented by the dotted line *d e f*, Fig. 5, having the furrow turned toward the row F, and the earth strongly laid up to the stems of the cabbages. Let the plough, when it is intended

to finish off the operation, be introduced so as to turn the earth toward the row E. In that case, the operator, by inclining his plough a little to the left, makes it cut in an oblique direction, instead of perpendicularly, as he has hitherto invariably worked; and, striking deep, so as to go quite to the bottom of the manured mould, he forms the opening *f b g*, so as to leave a clear opening in the middle, with the loose earth closely laid up to each side. If the operator be sufficiently expert, this will be done in such a manner that you could not easily tell in what direction the plough had been last drawn, the earth being so equally laid to both sides. The old Scotch swing-plough, with a straight mould-board, performs this operation in the most complete manner; but it can be done, though in a less perfect manner, by any kind of swing-plough.

I now come to explain a particular which I have found more difficult to render intelligible by words only, than any other part of this process; but which, when once understood, will be found to be as easy in practice as can be conceived.

The reader was desired not to give himself the trouble of inquiring how the plough was made to hoe many rows in succession, though all in the same direction. It now remains that I should show in what manner the plough can be returned successively to the same point without any waste of labour. With that view let the reader cast his eye upon the diagram, Fig. 6, the black lines on which are intended to represent rows of plants of any kind on a field regularly laid out for horse-hoeing. The plough we shall

suppose is to start at A, and, going right forward, it enters the field on the right hand side of the row marked B; and proceeding forward to the other end of the field, it opens a furrow, laying the earth from the row B toward the adjoining row to the right; then turning to the left hand, it returns on the other side the same row, laying the furrow from it on that side also. In this instance, the row B will be left precisely in the same state as every row is left after the first hoeing in the Tullian method. The plough proceeding forward to the end where it begun, which, for distinction's sake, we shall call the lower end of the field, it then turns to the left, and goes up the row 2, having the second row (or that row toward which the earth moved by the last furrow was laid) on its left hand, so as to turn the earth from it on that side. Proceeding forward, it turns at the head toward the left hand again, and returns down the furrow 2, leaving that row in the same situation as the former. After the same manner you proceed, widening always as you go round, and turning still to the left, till the rows become so far asunder as to make it inconvenient to turn longer in that direction. In general I have found, that when the rows are placed three feet asunder, about twenty rows may be done after one manner of turning, so as to form, as it were, one ridge; and a proportionally greater number where they are closer. I have only represented six in the diagram, because the circumstances can be as well explained by these as by any greater number, and more easily traced by the reader. When you find it necessary to shift to a new ridge on account of its

width, being returned to the same end from which you began, count the number of furrows you have opened, multiply half that number by three; then, beginning from the point where you stand, set off as many intervals as make up the number you have found; and then mark the row where you stop. In the diagram the ridge consists of six rows; and as three is the half of six, and three times three make nine, it follows that, passing these nine intervals, you mark the tenth row, which falls on the row *c* marked on the diagram. Move the plough then from where it stands, as marked by the dotted line and darts, and enter it on the interval on the right-hand side of the row *C*, and proceed exactly as you did at first, till you open successively the furrows 4, 5, and 6, both going and returning, as marked by the dotted lines and darts in the diagram. There now remains a space of six rows between 3 and 6, which is untouched. Turning the plough still to the left, as before, you open the furrow 7 going upward; but, instead of turning to the left at the top of the ridge, you now turn to the right, and go down the farthest untouched interval, opening the furrow 7 on the return. At the bottom, turn still to the right, and so again at the top, opening up successively the furrows 8 and 9, where you close, turning the earth on both sides towards *D*, so as to leave it exactly in the same state as a Tullian row would be left after the second hoeing. The plough, when this is finished, comes out at *E*, whence it may proceed to another. The reader, by beginning at *A*, and following the dotted lines in the direction of the darts, will be at no loss to trace the progress regularly through the whole.

It is unnecessary for me to go farther in this illustration, as the reader will easily perceive that he has only to proceed regularly after the same manner till he shall have gone over the whole field, and that every subsequent hoeing is performed by directly reversing this; beginning always in the second hoeing where he left off in the first, and leaving off where he began, and making the plough go in a contrary direction; that is to say, it would begin at the bottom in the interval 9 on the right-hand side of the row D, and return downwards in the interval 9, and so on.

The reason for reversing the turning in the middle ridge will not, perhaps, be obvious at first sight; it is to augment the breadth of the ridge, without making too much waste in turning at the end; for by this contrivance the breadth of the ridge is doubled, without any more waste in turning than if it had been half the breadth. Thus, let us suppose that the extreme breadth is twenty rows; if the turnings had been made all the same way, there would have been a reverse of the operation at every tenth row; but by proceeding after the manner here described, the work is reversed only at every twentieth row; though the width of turning is no more than before. As the rows where the work is reversed must be subjected to all the inconveniences to which the Tullian mode of hoeing is liable, the reader will easily perceive the benefits that accrue from thus diminishing their number. This is, in fact, the only inconvenience to which the mode of horse-hoeing here explained is subject. But if it be considered, that when the rows are at

eighteen inches apart (which will easily admit of being horse-hoed), it will only be every fortieth row which will suffer this inconvenience; and when it is considered at the same time, that this fortieth row is only in the same predicament, at the worst, with every row that is hoed after the Tullian fashion, the inconvenience will not be found very great.

The reader, it is to be hoped, will now be satisfied that it is possible to perform every operation in horse-hoeing by means of the common swing-plough; and farther, that these operations can be thus performed in a much more perfect manner than can be done by the aid of the double mould-board plough, usually adopted for that purpose. It is more than twenty years since I fell upon this mode of hoeing, nor have I ever employed another since that time; and I can truly say, that I never had reason to be more highly satisfied with any practice in agriculture than with this; nor do I think it possible, by any practice that has ever been adopted in the garden or in the field, to rear cabbages, in particular, to so much perfection as in this way; for these plants rooting firmly, allow the plough very safely to be drawn exceedingly close to the row while they are young; and the stems being firm, admit of the earth being laid very close about them as they advance in growth, which can be thus done in a more perfect and economical manner than is, I think, possible in any other way. Indeed, I never saw an operation in husbandry that gave me such entire satisfaction; as a field of cabbages done up in this way by an old servant of mine, who had, by practice, acquired a perfect knowledge of every

step in this process. The last hoeing, in particular, appeared to strangers who were passing to be a most extraordinary process; for the plants having reached by that time about three feet in height, reckoning from the bottom of the furrow where the horse went, and the points of the leaves nearly touching each other all along, it seemed as if the horse going through them would break them all to pieces, and the plough, being wholly buried among the leaves, did not discover the nature of the operation going forward; and thus it had the appearance of a very unaccountable process. This induced many to stop and look at it; but, when nearly examined, the rich mellow freshness of the mould stirred to so great a depth, and the neatness with which it was laid up to both sides, afforded a degree of satisfaction that few could find words to express. The roots of the plants being thus at liberty to run in a bed of fresh stirred mould in the highest tilth, being totally freed from the danger of suffering, in the smallest degree, from hurtful wet on the one hand, or from drought on the other; and this fine mould being genially moist by the absorption and overshadowing of the leaves, the plants advanced with a degree of luxuriance that I never saw in any other situation. About one week after they had received the last hoeing, they appeared perhaps to the greatest advantage. The mould was yet quite fresh after being so lately turned up; the leaves had entirely closed above the interval, which consisted of a wide and deep furrow so closely overshadowed that there was scarcely the germ of a weed to be seen; in this furrow a little person, by stooping, might have walked from end to

end of the ridge entirely under cover, while there was not a leaf to be seen in the whole field that did not display the highest degree of luxuriance. The cabbages in this case were of the large winter kind, called in Scotland the drum-head cabbages, from their great size and flatness; being sometimes fifteen or sixteen inches diameter in the cabbaged part. The rows were three feet apart, and the plants two feet three inches asunder in the row.

As it is of great utility to have the first hoeing as near to the plants as possible, and as they are then very small, and liable to be smothered by any earth that may fall to the left hand side of the plough, I found it a considerable improvement to adopt a very simple contrivance to obviate that evil; this was to fix a piece of milled iron plate to the coulter, allowing the other side of it to lean upon the right-hand side of the sheath, so as to close up the opening between the coulter and the sheath. To do this neatly, a thin slip of iron should be welded on one side to the edge of the coulter, leaving it open behind like a feather, as is represented at Fig. 7, in which A represents a section of the coulter; B the thin feather welded to it at the edge, and loose behind; and C the plate of milled iron, extending to the sheath D: a nail at *d*, either a screw, the head of which goes quite through the feather, or a clinch nail, secures it to the coulter; one of these nails above and one below are quite sufficient for this purpose. The feather prevents the edge of the milled plate from catching the mould or other obstructions, and thus allows it to cut clean and smooth. By this very simple contrivance, no earth,

even in the loosest soil, can ever be allowed to fall to the left-hand side of the plough. It is perhaps scarcely necessary to remark, that the sharper the irons are kept (by which is meant the less they have been grinded down by using) the more clean and perfect will the operation be, as this must be known to every practical farmer; but I have often observed, that if servants be not looked sharply after they are apt to be extremely negligent in this respect; in consequence of which, many operations on the farms of gentlemen of property, who amuse themselves with agricultural pursuits, are performed in a slovenly and imperfect manner, that must disgust them with such operations.

Happening nearly three years ago to be on the farm of Dishley, near Loughborough in Leicestershire, I informed Mr. _____, nephew and successor to Mr. Bakewell, of this method of horse-hoeing, which he immediately adopted; and he has since told me it answered so completely, that he considered it as a very great improvement in the mechanical part of agriculture, for which he returned me his warmest thanks.

I know no plant that would be more suited to this mode of culture than the sugar-cane, nor can I conceive any thing that could prove more beneficial to planters in the West Indies than to introduce this mode of culture universally among them, wherever the nature of the ground would admit of it. The difference between the tilth that the ground would thus be put into, and that which takes place by the imperfect manual operations to which it is now subjected, would be greater than persons who have not

seen any thing of this kind can form an idea of, and the crops would be proportionally augmented. I do not think I should be guilty of exaggeration if I said, that the produce of the same field, on an average of years, when thus cultivated, would be double what it can be by the other mode of culture: but say that it would be augmented only one fourth, the prospect would be sufficiently encouraging. And, after the ground was once put into good tilth, the expence must be greatly below what it now costs. I ground these expectations on the certainty that the crops would universally be much more luxuriant; that they never could be hurt for want of rain in the driest seasons; that the ground would continue to bear canes for a much greater number of years, without being exhausted, than by the present mode of culture; and that the plants, by being laid in the open furrow between the rows (upon a slight covering of manure where that could be afforded), and covered in by the plough, would not only spring up with more luxuriance; but, as this operation could be performed with very great expedition, and little labour, it would admit of getting the plantations finished off quickly during the critical season. To these advantages might be added, the facility with which rats might thus be destroyed; for, as the greatest part of the soil would thus be often completely turned up, their nests would be opened, and not only the young be thus destroyed (which cannot be done by the present practice), but the old ones also be liable to be killed by a few well-trained dogs, who might be made to follow the plough for that purpose.

Fig. 1.

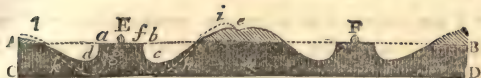


Fig. 2.



Fig. 3.



Fig. 4.

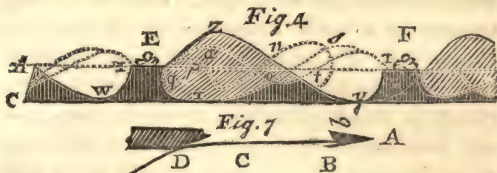
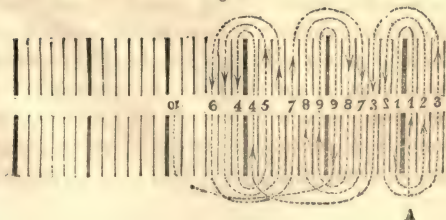


Fig. 5.



Fig. 6.



I am aware, that were any person to attempt to introduce this practice into the West Indies, difficulties would at the first occur which might be sufficient to discourage a feeble spirit of enterprise; but these are by no means of such a nature that they might not be removed by a little address and perseverance; and where the prospect of advantage is great, trifling difficulties ought not to suppress exertion. The want of proper implements would be one objection; but the greatest would be the want of men thoroughly acquainted with this kind of manipulation, and of horses properly trained for the purpose. One skilful hand, however, of a steady disposition, carried from this country with that intention, would soon be able to train beasts for that purpose, know how to keep the plough in order, and how to proceed in every case; and under his care any number of negroes, by means of well-judged premiums, might soon be taught to do it in the most perfect manner. Were but one proprietor of an extensive estate as much convinced of the utility of it as I am (and the want of experience alone prevents that), the thing would soon be done. A single horse, or a mule of a moderate size, would be quite sufficient (after the ground were once put into proper tilth) to perform every part of these operations; and one such animal, with his driver, would be sufficient to cultivate a great many acres in a year in the most perfect and complete manner. Let owners of such lands as are fitted for this kind of culture compute the saving they would thus make by the diminution in the number of slaves that this would admit, and they will perceive that it is an object of

vast moment to them. If I can be in any way aiding to them in this respect, it will give me pleasure to afford them all the assistance in my power; as I shall have the pleasure to think that I thus contribute, in some degree, not only to their particular emolument when individually considered, as well as to add to the national prosperity, but at the same time shall considerably augment the sum total of human enjoyment.

J. A.

NATURAL HISTORY.

General observations on Insects.

To some readers it may perhaps appear a little surprising that we should begin our survey of nature with what they may deem the most insignificant part of it; but many reasons have concurred in determining that choice. In the *first* place, the objects which constitute this class of animated nature, being so small as in a great measure to elude the cognisance of our senses, will offer more novelty when brought under view than those of a larger size, and of course will prove, in general, more interesting; for no truth is more certain, than that things which are in themselves of the most interesting nature, become perfectly indifferent when long acquaintance has rendered them familiar; and are suffered to pass by without attracting the smallest degree of notice. It is from this cause that the common vicissitudes of nature, which began

to operate upon the senses before the understanding was awake, are too often suffered to pass away like the shadow of a cloud, without being able to make any impression upon that understanding even until the present hour. In this manner the common powers of animal life, which, if they were adverted to, could not fail to affect the mind with an awful impression of astonishment and wonder, are suffered to operate unheeded, as if unseen. We all know, for example, that, whenever inclination prompts us to it, we can, by a very slight exertion of our vital powers, lift our hand to our head. Nothing seems to be more simple or more easy than this action;—yet, when we try to form an idea of the way in which that incorporeal existence which we call *mind* can operate on matter, and thus put it in motion, we are perfectly lost in that incomprehensible immensity which surrounds us. When we try to investigate the properties of matter, we perceive that by patience and attention the human mind can make a progress in attainments to which no limits can be assigned. The motions of the plants can be ascertained, their distances measured, and their periods assigned. The mathematician can demonstrate with the most decisive certainty, that no fly can alight upon this globe which we inhabit without communicating motion to it; and he can ascertain with the most accurate precision, if so he choose to do, what must be the exact amount of the motion thus produced. In this train of investigation the mind of a Newton can display its superior powers, and soar to a height that exalts it far above the reach of others; but, in trying to explain the cause of ani-

mal motion, the meanest reptile that crawls upon the ground is on a footing of perfect equality with a Newton; they can all alike exert the powers conferred upon them by the almighty Creator, without being able to form the smallest idea of the way in which they are enabled to produce these effects. Man, however, can contemplate these effects if he will: and man, perhaps alone, of all the animals that exist on this globe, is permitted, by contemplating the wonders that these unfold, to form, if he pleases, some idea of his own nothingness, with a view to moderate his pride, and thus to exalt himself above the unconscious agents that surround him.

When the anatomist considers the number of muscles that must be put in motion before any animal exertion can be effected; when he views them one by one, and tries to ascertain the precise degree to which every individual muscle must be constricted, or relaxed, before the particular motion indicated can be effected,—he finds himself lost in the labyrinth of calculations in which this involves him; but when he considers that every one of these muscles must be constricted or relaxed to the precise degree that appertains to each, and no more, and at the same instant of time; when he recollects, that the smallest jarring in this respect in any one of these would throw the whole into inextricable disorder; when he considers with what promptitude the whole of this is done in an instant by the mere act of his volition, and how in another instant, by a change in that volition, all these muscles are thrown into a different state, and a new set brought into action, and so on

continually as long as he pleases, his mind is lost in the immensity of wonder that this excites. But when he farther reflects, that it is not only he himself that is endowed with the faculty of calling forth these incomprehensible energies, but that the most insignificant insect is vested with powers of a similar sort, he is still more confounded. A skilful naturalist has been able to perceive, that in the body of the poorest caterpillar, which, in the common opinion, is one of the most degraded existences on this globe, there are upwards of two thousand muscles, all of which can be brought into action with as much facility at the will of that insect, and perform their several offices with as much accuracy, promptitude, and precision, as in the most perfect animal; and all this is done by that insect with an equal consciousness of the manner how, as the similar voluntary actions of man himself are effected.

Now, although it is impossible for the human mind to contemplate any object that is more naturally calculated to arrest attention than the mere impulse of animal energies, when considered under this point of view; yet, from our having been accustomed to see these energies uniformly exerted by the objects around us from the first moment that our perceptive faculties began to operate, we regard them only as things of course, that are unworthy of farther notice: we, in like manner, suffer to pass unobserved, as the common course of nature, those phenomena respecting animal life which apply to the larger creatures with which we are surrounded; but when we come to remark the diversities in this respect which affect the more mi-

nute creatures that have but feebly attracted our notice, these deviations strike us as objects of curiosity and wonder, and fix the attention more strongly than the others; although, if the case had been reversed, we should have found the wonders to have existed in respect to those objects that are now common, and in our opinion natural; for natural, with respect to us, only implies that the appearances to which we give that name accord with those ideas of nature which our situation hath enabled us to observe; for, in general, all the phenomena respecting animal life are alike beyond the reach of our finite comprehensions.

We see, for example, that every animal is endowed with the power of volition, and that, in consequence of exerting that power, he is able to make his body exercise all the functions which it is naturally calculated to perform. We see also, that every animal feels certain impulses (of the origin of which it is alike unconscious, as it is of the source of voluntary motion), whereby it is induced to exert certain volitions, which produce actions of a particular tendency, that in general serve to nourish the life of the individual, to insure its welfare, or to perpetuate its kind. An animal experiences that sensation which we call hunger, and this sensation invariably produces a desire to search for food, and a tendency to bring into action all those organs that are prepared for introducing that food in a proper manner into the body; and, however differently constructed these organs may be, each individual at the first applies these organs to the purpose for which they were intended, without

being conscious either of their powers or the uses for which they were intended. Thus the young of all the mammalia class of animals no sooner begin to breathe, than they search with their mouths for the teat of the mother, and when they find it, endeavour at once to draw from it by suction the nutritious fluid prepared by nature for their subsistence. The chicken, on the contrary, feels no such propensity. It is directed by that invisible hand which first formed and still supports this universe, to look for the food that its mother provides, and to pick it up with its bill. The ant tears its prey asunder with its teeth; the bee sucks up the honey by its proboscis; while the midge pierces the skin of larger animals with its sting, and thus finds the food intended for it. Each of these, directed alike by that invisible impulse, feels at once the power of those organs with which they are respectively furnished, and gives play to every muscle that is necessary for performing their respective functions. This invisible and unerring power we distinguish by the name of instinct, which is alike irresistible as incomprehensible to us; but its influence we know is universal among animated beings, and its operations so steady, yet so diversified, as to unfold to the attentive observer a never-failing source of wonderful phenomena:

I see a mighty arm, by man unseen,
Resistless, not to be controul'd, that guides,
In solitude of unshar'd energies,
All these thy ceaseless miracles, O world!
Arm of the world, I view thee, and I muse
On Man, who, trusting in his mortal strength,
Leans on a shadowy staff, a staff of dreams. C. LAMB.

In the exercise of those instinctive energies we shall find, that among the minuter objects of nature they are much more diversified, more powerful, more invariable in their aim, and more wonderful in their effects, than among the larger orders of animals, among which we perceive more frequent deviations, originating in partial approximations to reasoning, or the imitative principle. It is among insects, therefore, that we are to look for the developement of instinct in the utmost plenitude of its power.

In the *second* place, I was induced to begin with this department of natural-history from the consideration, that without the knowledge of it no adequate idea could be formed of any other branch of natural-history. Though insects be of a diminutive size, yet their numbers are so great, and they are so universally disseminated throughout the globe, that scarcely any object in nature can be found that is not liable to be affected by them in one way or other. Every plant, and every living thing is subjected to various diseases, and to death itself under a vast diversity of forms, in consequence of the operations of these diminutive beings; nor are earths themselves, nor stones, protected from their ravages. The air that we breathe, and the waters that we drink, are crowded with insects; and many of the natural qualities of these elements are greatly altered at times by the presence of these objects. Without an adequate knowledge of this class of beings, therefore, we should be perpetually at a loss in our investigations of other subjects; and it must indeed be owned, that nothing has tended so much to retard our progress in many useful

branches of knowledge, as the general ignorance of this branch of science which so universally prevails; for we can scarcely say, that it has yet fairly begun to be studied.

Not only do insects become interesting to us on account of their baneful influence on the objects that claim our notice: on many occasions they ought to attract our regard on account of the benefits that are drawn from them. Many varieties of this class derive their nourishment from earth alone, and mineral substances and water, without the direct intervention of vegetable or animal matter of any kind; they also consume the excrementitious and putrid parts of animal substances, and extend the bounds of animal existences beyond the sphere to which it must have been confined, had vegetable or animal matters alone in their perfect state been used as a pabulum of life. These insects also, being small and universally disseminated, afford in their turn abundant food to innumerable creatures of a larger size, and thus contribute to the multiplication and support of fishes and fowls, and an infinite diversity of other creatures; so that they may be said to clothe every part of this globe, even the most barren, with an abundant provision of food for animated beings, which, but for this circumstance, could have had no possible means of subsisting. They may be, therefore, said to operate in the natural world like the base in music, tending to blend together and harmonise the whole, and thus to extend its influence and power much farther than it could ever otherwise have gone. On all these accounts it claims a decided right to our earliest notice; not to mention the bene-

fits man directly derives from the operations of many of the insect tribes.

In taking a rapid glance at the circumstances which serve peculiarly to characterise this class of objects, we are able to perceive several prominent particulars that very clearly mark a separation between them and other animated beings, and which it will be of importance to point out before we proceed to the investigation of particulars.

Insects, in general, belong to the oviparous class of animals. In this respect they agree with birds, and a few other creatures of a larger size. But we have already had occasion to remark (page 28), that the young proceeding from the eggs of these larger creatures assume, at the moment they come out of the shell, the shape and general appearance of the parents which produced them, and suffer no other material change than some slight variations in the colour or consistence of their external cloathing, the proportions of the body, and a gradual addition of size till it attains its ultimate degree of perfection, when it is in a condition to propagate its kind. Among insects the case is very different. When this class of beings come forth from the egg, the young is not only smaller in size than its parents, as among the larger animals, but it is also for the most part of a conformation of body so extremely different from them, that it is impossible to recognise the smallest point of resemblance between them: in general the young, or *larvæ* as they are technically called, of insects, when they first issue from the egg appear in the shape of some sort of worm-like creature, whatever has been the

form of the parent; in this state it is always a voracious animal consuming a great deal of food, while it at the same time increases in size, and having by degrees attained the full stature prescribed by nature for the class of beings to which it belongs, it at last, after having undergone various lesser changes, assumes the form of the creature which produced it; and comes, in its turn, to be in a condition to lay the foundation of a new generation to succeed it.

It usually happens, that the *larva* of any insect continues to bear the same shape and form that it had at issuing from the egg, and retains its primary instinctive habits during the whole period of its growth; after which it undergoes several changes before it assumes its perfect form, or *imago* state as it is technically called, that will be more particularly noticed in the sequel.

But there is one very material difference between the *larvæ* of insects, and the young of the larger animals, before they have attained their full growth; for, although they are both in a state of increment, this proceeds after a very different manner. Among the larger animals, all the parts of the body advance by a gradual augmentation without any change of parts, the skin in every part continuing for the whole time flexible, and expanding as the parts grow, so that the same skin all the while covers the body from first to last without any change of parts. Among insects on the other hand, though the skin when it is young and fresh be soft and expansile in a small degree, during which period it dilates in some measure so as to adapt itself to the increase of the body, yet it soon

loses that expansile quality, and growing tense, and in some degree brittle, it becomes too tight for the body. At this period of its growth the animal for a short while loaths its food, and, after a few convulsive exertions, bursts its skin asunder, and comes forth in a cloathing entirely new in every part; after which it recovers its former appetite and vigour, increases in size for a time, till this second skin becomes old and rigid, when it throws it off in the same manner, and then goes on as before during the third period of its growth; and so on it proceeds, as it were by stages and alternate rests, till it has attained the full extent of its size, when it prepares for another and a greater change that will be afterwards noticed.

If there be any insects properly so called that do not thus change their skin during the period of their growth, they are rare, and may be considered only as singular exceptions to a rule that is nearly universal. In general also the alterations that take place in the form and habits of the creature during this period of its existence are very inconsiderable, usually extending no farther than to a small variation in the colour, or some other lesser circumstances; but the form for the most part remains during all this time nearly the same as when it issued from the egg. If it assumed the form of a caterpillar with a greater or smaller number of feet, it continues a caterpillar still with the same number of feet during all the stages of its increment. If it appeared at first in the shape of a worm, with or without legs, it continues a worm of the same kind, only differing in size in all its future stages, and so on; and during all this time it continues to feed on

the same substances, and to follow habits that do not differ in essential particulars. The number of times they thus change skins differs greatly among different classes of insects, and will be duly noticed as the particular insects come under review.

After these *larvæ* have attained their full size they prepare for a much greater change than they have hitherto undergone. This is, in general, begun by a total abstinence from food for some time, and which is followed by their preparing for themselves a kind of house, or nest, as an asylum in which they can remain undisturbed, and as free from danger as possible, during that state of imbecility which they would seem to foresee is about to happen to them. The form of these nests, the materials of which they consist, and the manner of constructing them, are infinitely varied, and afford a subject of never-ending admiration to those who take a pleasure in making themselves acquainted with the manners and habits of this little people. The greatest part of the caterpillar tribe are endowed with the faculty of drawing from their bowels a kind of silk, which is employed chiefly for the purpose that I now describe. Among these the cocoon of the silk-worm is the most perfect that has hitherto been discovered of this kind; and the uses to which it has been applied by man are well known. Many other caterpillars construct cocoons of a similar kind for the same purpose, though they are (all that have as yet been discovered) less proper for the use of man than those of the silk-worm. This silky substance is in many caterpillars so little abundant as not to admit of their making cocoons entirely of silk. In

some cases they are only lined with a thin coating of it in the inside, while the outer crust consists of coarser materials. In others, no more silk can be afforded than is barely sufficient to connect together pieces of earth or other materials that they rear up around them in a regular form to answer the same purpose; or to afford a few threads to bind themselves firmly to some support to prevent them from falling down during their state of imbecility. Other caterpillars that have no silk at all, are provided with a supply of a particular kind of liquid, with which earth, or other matters, when moistened by it, are instantly glued or cemented together, so as to keep the whole firm. Others again, and these are very numerous swarms, when they feel the time of their change approaching, bury themselves in the earth, where they form for themselves beds of different constructions, each according to its kind, in which they undergo the change of which I now proceed to give a very slight general idea, leaving particulars till we shall come to individuals.

After the worm has finished its resting place, or cocoon, as it is technically called, it soon places itself at rest. The body contracts greatly in length, becoming at the same time much thicker than before. By slow degrees it assumes the form of an oblong ball, that is for the most part covered with a firm and polished crust, much resembling the shell of some kinds of fruit. The gloss of this skin is usually very bright, and the colour of some kinds at a particular period of the process assumes the brilliance of burnished gold, from which circumstance the Greeks gave these in-

sects, while under this form, the name of *Chrysalis*, and the Romans *Aurelia*, both of which names we now indifferently use. Under the form of this shell-like crust the creature seems to be entirely dead; no symptoms of life being discoverable, except a very slight movement of the tail at times when the chrysalis is handled. In this inert state it remains for a certain period, sometimes many months, sometimes only a few days, according to the nature of the individual insect, and the circumstances in which it is placed. During this inert period the body enclosed in this case is found to undergo a gradual change, and (without specifying particulars here), losing the shape of a worm, it assumes at length the form of the fly (or other insect) from which it originally proceeded, having all its limbs and other members curiously folded up, and closely wrapped upon each other, as may be distinctly perceived with the naked eye by any one who removes the case with a view to examine this particular. Here it remains for some time like the chick in the egg, discovering at first only some feeble symptoms of life, which, continually augmenting, it acquires greater and greater powers, till it at last bursts its temporary tomb, and, leaving the ligaments that covered it behind, comes forth in its complete and perfect (imago, or pupa) state; when its wings quickly acquiring a proper consistency, it soon after takes to flight, and performs the functions in this state which nature had allotted to it.

Numerous tribes of insects, however, undergo this last great change in a manner very different from that just described. The covering which encloses their

bodies while this change is going forward is not such as to conceal them so entirely, nor is the state of inertness so great as of those of the chrysalis kind; and as the parts of the future insect can thus in some cases be more distinctly perceived swathed up as in a sort of light bandages, naturalists have called the insect in this state a *Nymph*, instead of a *Chrysalis*, or *Aurelia*. But as nature never acts by starts, but proceeds by gradual movements from less to greater in every case, it happens here also, that in some instances it is difficult to distinguish a *Nymph* from an *Aurelia*; and in other cases, the *Nymph* continues to eat and exert its vital functions till the very moment of its change, with no other alteration from its former state than a gradual developement of some particular organs under the former skin, which alter its proportions; while in other cases again, it undergoes a considerable change of form, and lives for a period of considerable duration under a shape very different from that which it bore in its past, or will assume under a future period of its existence. But of these, and other lesser variations, it is unnecessary to enter here into particulars, as they will be more regularly noticed hereafter. Our business at present is merely to convey some general notions, that may serve to render particular explanations generally intelligible, without recurring to frequent repetitions.

In no one respect do insects differ more from the larger animals, than in what regards their growth. We have been so long accustomed to observe young animals grow gradually larger from infancy to age without any change of form, that we naturally feel a

tendency to believe, when we see two insects nearly of the same form, two flies for example, but of very different sizes, that the one is the young of the other, and that it will in due time attain the same size. This, however, is far from being the case. Insects in general are of the same size that they ever attain the moment they assume their perfect form. In this pupa state, indeed, their life is for the most part so short as to give little room for alterations in this respect, some of them living only a few hours, others a few days, or weeks, or months at most; so that the propagating the species forms the sole business of their lives; and many of them are not even endowed with organs through which food of any kind can be conveyed into the body. The whole growth of an insect, we have already remarked, takes place when in its larva state; it may therefore be considered as a very general rule, that if any unknown insect increases in size while under observation, it cannot have then attained its perfect form, but must be only the larva of an insect that has yet to undergo some changes. It does not, however, follow, by a converse of this rule, if we see an insect which lives for some time in an active state of existence without increasing in size, that it has even then attained its perfect state; for we shall soon have occasion to show that there are some insects which, under the form of a *nymph*, are active and voracious, and live in that state for a considerable time after they have lost their vermicular form, but which still must undergo another change before they are in a condition to propagate their kind.

Insects, however, do not in reality differ so much

from larger animals respecting their growth while in the imago state, as strikes us at first sight. The insect assumes that form only the moment it has attained the age of puberty; at which period of their life most of the larger ones have also attained their full stature, and advance no more, so that in this respect they are exactly on the same footing with a fly, or a butterfly, which in that state increases no more in size.

The life of insects in their pupa state being so short, the whole arrangement of their economy with regard to perpetuating their kind is extremely different from that of the larger animals. The females of the insect tribe in general, after depositing one brood only, feel their vital powers exhausted, and then die. But that brood, though one, is extremely numerous, and far exceeds the utmost bounds of prolifickness among the larger animals. The body of the female is in general filled with little else than eggs, which amount on most occasions to several hundreds. Among some species, the whole of these are extruded from the body at once; but for the most part they are deposited in succession, and with more or less rapidity in the different species, according to the duration of its life, and other circumstances.

But the circumstance that must ever appear among the most interesting of those wonders which the study of *Entomology* so copiously unfolds is, the surprising instincts by which these diminutive beings are directed by an unerring providence to pursue with an unceasing assiduity those measures which are the best adapted for providing for the wants of that posterity which is to spring from them, and to guard their young from

those dangers to which they must be so inevitably exposed. These instincts induce a procedure on innumerable occasions, which, to those who wish to set aside the over-ruling influence of a superior power, would seem to indicate a degree of foreknowledge of a kind that so infinitely surpasses the boasted powers of the reasoning faculty, when aided even by the utmost experience of the maturest age among the human species, as not even to admit of a comparison between them for one moment. Yet these creatures of a day, the moment they exercise their vital functions, proceed with the utmost alacrity, and the most unwearied perseverance and steadiness, each in its kind, to provide for that future progeny which it never has seen, which most of them never can possibly see in life, which is frequently destined to live in an element in which it could not itself exist one moment, and to subsist upon food that would prove most nauseating to the parent; and all of them go forward with the most undeviating steadiness in the same course that their forefathers have pursued since the very beginning of time. The devices that are adopted by different insects for these purposes are so wonderful, as to have attracted the notice of naturalists in all ages, though still they are but known in part; and every day gives birth to new discoveries in this most interesting field of literary research; some of which we shall have occasion to unfold at a very early period in this work.

[*To be continued.*]

MISCELLANEOUS LITERATURE.

To the Editor of Recreations in Agriculture, &c.

SIR,

A CORRESPONDENT has given in your first volume a just and perfect description of the annual renewal and growth of the horns of the fallow deer; at the conclusion of which you request him, on some future occasion, to add some other remarks respecting the habits, the natural economy, and voluntary separation of the males from the females at certain seasons of the year; the extreme leanness of the males at one season, and their rapid fattening at another, even with very little food; the manner in which the time of fattening may be accelerated or retarded; the season at which the venison of the buck, the wether (but more properly called the heaver), and the doe, are respectively in greatest perfection, &c. But first I must beg leave to correct an error into which your correspondent seems to have been led. He professes to give the history of the horns of the fallow deer, and, more fully to identify the species, calls it the cervus dama, and then begins with the hart sheds its horns, &c. Now the hart is not the fallow deer, cervus dama, but the stag, or red deer, cervus elaphus; and it is necessary to ascertain the distinction, because their seasons are different; the stag precedes the buck in the rut about three weeks, and also drops his horns about the same time before the buck. The hind, or female stag, goes with her young, called a calf, a few

days longer than the doe with her fawn, which is about eight months. This point settled, we begin with the buck.

The doe brings forth her young in the month of June, at which time she seeks a retired spot among fern, or other cover, where she drops her fawn, which, for a day or two, until it is able to follow her, she leaves, and feeds on some adjacent spot within the hearing of its voice, should it be attacked, and returns to suckle it occasionally, or to protect it if alarmed. The first year it is called a fawn, and has no horns; the second year it is named a pricket, with horns about four or five inches long, terminating in a single point; the third year his horns are renewed, and increase in length; they now divide at the top with a small spur at bottom, called an antler, and he takes the name of sorel, which in the fourth year is changed to that of sore, when his horns receive an addition both in length and branches; in the fifth year he arrives to the honour of being called a buck of the first head, and his horns now take the pal-mated form; and in the sixth year an old buck, when he is accounted fit to be killed; but if he is suffered to live a year or more longer, he will improve both in flesh and fatness; for it is noticed, that their strength increases with age. Towards the beginning of October their throats begin to swell, when they make a noise called groaning, with a kind of rattling in the throat, which they do at no other season; they then associate with the does, when the oldest and strongest, becoming masters of the herd, keep the younger male deer at a distance. At this period they neglect their

food, and thereby become excessively lean; and it is observable, that the more they are wasted at this season, the fatter and finer will be the venison, for the most part, in the summer following. About November they separate from the Does till the following autumn. In May their horns are renewed in the manner before noticed, during which tender state of the horns they are sensible of their inability to use them either for offence or defence; and if a contention should arise during that period, they stand erect, and strike with their fore legs. The female is called a Fawn the first year, a Teg the second, and the third year a Doe; after which they are esteemed proper for the table. Nevertheless, such Does as are intended to be killed in their season are either barren the preceding summer, or have their Fawns killed or taken away young.

The season for killing deer in the king's parks, before the alteration of the stile in the year 1752, was, for the Buck from the twenty-fourth of June to the fourteenth of September, and the Doe from the first of November to Candlemas day; which, as it is impossible to alter seasons with dates, may most probably now be deferred to the old stile, eleven days later. It is not unc customary with some to have paddocks or small inclosures adjoining their parks, in which, in the month of November, they place such Bucks as they intend to kill the following summer, and where, being kept quiet, in better pasture, and with a sufficiency of hay during the severity of winter, they improve in flesh sooner, and acquire a superior degree of fatness in the season following. The Heaver is seldom

met with, except with gentlemen who are fond of having venison at their table after the Buck is done with; for, not being subject to the rut, they continue in season until the Does are fit to kill; and, though they grow to a larger size than the Buck, they are not esteemed of equal flavour or fatness.

Though the *cervus dama* takes the name of fallow universally, yet their colours are various, as light brown, dark brown, white, black, and some with white faces; and about seventy years ago another variety, called Menel, was brought into this kingdom from Bengal; at which time, it is said, the gold and silver fish were first brought from China. The Menel deer are of a reddish brown, spotted with a clear white, and when arrived to full age, with a large branching head, is the most beautiful animal imagination can picture. They readily associate with the other deer; and in those parks that have been able to procure them they make a pleasing contrast with the others, and add abundant beauty to the general herd. VERAX.

The following translation from "Gorani's *Memoires secrets sur les Cours d'Italie*" has been sent to me by the obliging attentions of a friend. Those who have made themselves acquainted with what a translation ought to be, will no doubt be desirous of seeing many such. Those also who attend to the matter will as naturally wish to be better acquainted with the writer.

Travels of the King (the present) of Naples.

UNTIL the time fixed by Ferdinand for the commencement of his travels through Italy, and after-

wards into a part of Germany, he appeared to occupy that place in history which is only assigned to kings by chronology. Hunting and fishing had, as is well known, occupied his whole time till that period. He was a nullity to himself, and to others.

Foreigners, whom curiosity had attracted to the court of this prince, and who only saw him in the midst of such frivolous amusements as a most shamefully neglected education had made him resort to for necessary occupation, could not but carry back with them to their own country a very unfavourable idea. If they heard any of his witty replies told to them, which announced courage, reflection, or energy of mind, they thought that flattery had made them for him, or at least had wonderfully embellished them.

Although it be true, that swarms of flatterers surround the cradles of princes, and accompany them to their tomb, it is yet very difficult to prevent their real character from bursting through the pomp which incircles them, when they show themselves to the eyes of a nation that has nothing to fear or hope from them. In travelling they are brought nearer to the observation of mankind. Forced to speak and act from their own ideas, and from their own minds, the masque falls off, the man is known and judged without appeal, as well as without partiality.

From the moment that Ferdinand had passed the frontiers of his own kingdom, his indolence disappeared. Weakness was superseded by good sense; and that natural understanding which an execrable education could not smother, burst through the bonds that had hitherto confined it.

Too great a lover of truth even to think of hiding his defaults, he did not seek to cover his ignorance under an affected reserve. Always affable, and even popular in his manner, he conversed with every one that came near him, and never was known to ask foolish questions; on the contrary, they all shewed a plain good understanding, with a desire to be informed. His conversation was full of ingenuousness, intermixed with bon mots. The voluntary avowal of his ignorance, which it had not been a fault to have avoided, made him truly interesting to a philosopher. It is universally agreed by all those who have known him on his travels, that he is, of all the Bourbons, the one that unites the most good sense and character.

Ferdinand began his travels at a period which was likely to give an active turn to his mind. The emperor Joseph the second, and his brother Leopold, were at that time on their travels. The same idea had made each of them quit their kingdoms; they were anxious to learn how to govern them better. It will, perhaps, seem extraordinary that the king of Naples, whose ignorance is generally known, should be in a situation to give these princes lessons in the art of governing; but every effort of art must bow down before nature.

These three sovereigns met each other in their routes very often. Leopold had information, but he had the passion of showing it. Anxious to see every thing, to decide upon every thing, and to regulate every thing, he took it into his head that he had a right to govern all who came near him. He thought

proper one day to preach to the king of Naples, and to repeat to him a series of principles of government, advising him at the same time to profit by them on his return to Naples. Ferdinand listened to him with the greatest attention, and replied to his learned discourse by the following question, uttered in the jargon and tone of a Lazzaroni of Naples. "Tell me, doctor, hast thou many Neapolitans in thy service, or in thy kingdom?" "Not one." "Well, my great doctor, know then that there are many thousands of Tuscans in my kingdom, and in my household; would they be there, if thou hadst taught them to gain their bread in their own country?"

Struck at perceiving an impression of melancholy on the countenances of the inhabitants of Tuscany, Ferdinand said to Leopold, "I cannot conceive of what use all that learning is which thou hast acquired; thou art continually reading, thou hast a great deal of knowledge, thy people imitate thee, and yet there is among them all a melancholy appearance; thy cities, thy capital, thy court, every thing that approaches thee, have I know not what of a lugubrous look. As for me, I know nothing, I can talk of nothing, and yet my people are so gay. Oh, I would not live a fortnight at Naples if it were like Florence. Nevertheless, I know that in the time of the Medici every one there lived happily and gaily."

On another occasion, he replied to a long preaching: "What thou hast just said may perhaps be very true; but I still think, that a happy people cannot be melancholy, and thine is very much so. Take

my advice, govern them a little better; thy preaching tires them."

Ferdinand was acquainted with the emperor Joseph, having seen him at Naples. He also met him at Mantua, Milan, and at many other places. Joseph surpassed Leopold in the rage of governing. Ferdinand, fatigued with his frequent repetitions of the same things, answered him in that rough gaiety which characterises him: "I feel all the difference that is between us. When I was about to begin my journey, I was obliged to keep it a secret from my people; whereas, on the contrary, thy subjects are only happy when thou art absent."

"Now listen in thy turn," said he another time; "thou sleepest upon the boards, thou sleepest little, eatest in a hurry, and digestest badly. Occupied incessantly with reading and thinking, and avoiding every amusement, thou takest the most incredible pains, and makest thyself the most wretched of men; yet, notwithstanding all this, every thing goes ill with thee. Thy subjects fear thee;—very soon that fear will turn to hatred; and I, my friend, I pass tranquil nights; I eat with an appetite, and digest easily. I do all the good that my coarse common sense suggests to me; my subjects love and are contented with me; but above all, they love me, though I do not take the hundredth part of the trouble which thou dost with thine. Follow my advice, take more repose thyself, and let others do so too."

Joseph one day in a conversation, loud enough to be heard by seven or eight persons who accompanied

him, told Ferdinand that the governments of the kingdom of Naples and Sicily were full of disorders, and that their internal administration was very bad indeed. "I know well," answered this ingenuous prince, "that my government is not faultless; but, being convinced of my own ignorance, I am afraid of touching the least part of it, for fear I should augment the abuses in attempting to repress them. It is very easy to change every thing; but to make a change for the better is the great difficulty. If I should have proposals made to me of great improvements, and it were fairly proved that they would be so, with what joy would I accept of them! But to replace one abuse by another as bad, and often more dangerous than the one abolished, shews plainly that folly, not reason, has been the directress. I shall leave things on their ancient footing, until I shall have clearly shewn to me a radical and real improvement; and by so doing I shall at least avoid tormenting my subjects uselessly. Learn, thou who changest every thing, and who art governed by the rage of innovation, that for us princes a little knowledge and small talents are dangerous rocks, and for our people a curse."

Ferdinand, on his return from his first journey, gave himself up for some days to a continual reverie. He constantly occupied himself in reading over and over the notes that he had made of all he had seen and heard, and was frequently observed to be much affected by it. He shed tears on the situation of his subjects, and, being above all kind of affectation, he did not endeavour to hide them. "Oh," said he, "my travels have only served to show me the pro-

fundity of my ignorance. They did not educate me as they ought to have done. It is now that I feel the great want of information; I would give all that I am worth if there were yet time for me to acquire that knowledge which makes good kings, those acquirements which would place me in a situation to render my subjects happy. I love them, and I know that I am Beloved, without having any way deserved it but by a barren good will."

The journey to Italy, however, produced on Ferdinand a visible change; his mind, having been exercised by comparisons, became more active. From this epocha every thing that he has done from his own free will has been commonly good. His dispatches are not elegant indeed, but they are clear, and characterised by good sense. Whatever he thinks himself is always better than the ideas that others suggest to him. It is to the king, therefore, that the little good which is done is to be attributed; and if he had but firmness enough to guard him against the plans which are laid for him by those who, from their situations, should act otherwise, it may be safely affirmed, that there would not be any state better governed than that of the two Sicilies.

Notices of a tree, a native of high latitudes, which can be made to afford an abundant supply of nutritive farinaceous food for man, and other valuable products.

AT a time when the crop in this country has fallen so much short as at present of its usual standard, in

consequence of an inclement season, it becomes a duty in every individual to suggest such hints as come within the sphere of his observation, tending to mitigate in future the effects of similar calamitous seasons. It was a consideration of this sort that induced Dr. Anderson of Madras to begin that glorious career which will long render his name dear in India; and, though similar success cannot be expected to result from the exertions of any individual in Europe, yet, as something may be done, no individual should be discouraged from lending his aid in such a cause, from the fear of any obloquy in which it may eventually involve him.

With civilization of manners, selfishness of principle is so necessarily connected, as to dispose men in polished society to give very little credit to exertions that are said to spring from a disinterested principle; and credulity is so frequently the offspring of ignorance, that mankind in general, if they listen at all to proposals that point out important improvements which have been overlooked by their predecessors, do it with such a contemptuous indifference, as produces no other emotion but that of a supercilious self-approbation and silent neglect. By the operation of these causes the ardour of research is infinitely repressed among us; for few thinking men are willing to place themselves in such a situation as shall expose them to the imputation of imbecility or extravagance of mind. Many objects which are easily within our reach, and which might tend greatly to ameliorate the lot of humanity, are thus suffered to remain for ages unattended to, and without being applied to any valuable

purpose whatever. A volume might be filled with examples illustrative of this truth, drawn from the records of past times; but I shall for the present confine myself to two notorious instances, which may, I hope, tend to blunt the edge of that obloquy to which I feel I shall be exposed in consequence of my stepping forward on the present occasion.

Silk, as an article of luxury, was known for a long time in Europe before any idea could be formed of the way in which it was produced. On account of the lustre and singular beauty of the material, and the delicate texture of the fabric, silken goods were then reckoned equal in value to their weight in gold. This circumstance must, no doubt, have excited in many men a strong desire to become possessed of a treasure of so much value; and could not fail to awaken a very lively spirit of research on that subject. At length, two monks who had travelled as far as China, having had there an opportunity of observing with their own eyes the manner in which it was produced, were at pains to make themselves thoroughly masters of every step in the progress of this manufacture; and having procured a quantity of the eggs of the phalæna from which the silk worm is produced, they made the best of their way back to their superiors at Rome, happily bringing with them in safety the valuable treasure which they had obtained. As the mulberry plant grows in Italy as well as in China, they found no want of food for the young fry when they were hatched. Under the direction of these two men, the knowledge of the manner of feeding and rearing the silk-worm soon came to be universally diffused among the peo-

ple; and in a short time silk came to be a staple production of Italy, as it had formerly been of China.

For many ages afterwards all the nations in Europe were supplied with this valuable article of commerce from Italy alone; nor did any of the tramontane nations (as the Italians call all countries beyond the Alps) once seem to entertain an idea of the possibility of being supplied with that article at home; although, on account of their daily intercourse with Rome in those days, there could be little difficulty in obtaining the necessary information respecting it, had any one ever thought of entering seriously upon that investigation. At length, after the lapse of more than one thousand years in this state of mental torpor, the enterprising mind of Henry the Fourth of France grasped the idea of the possibility of extending the production of this valuable article beyond those bounds to which it had hitherto been confined. He knew that the mulberry grew in the south of France as well as in Italy; and that the insect that feeds upon it might also be reared there, he could see no good cause to doubt. It had prospered after it had been brought from China to Italy; why might it not also prosper when carried from Italy to France? These reasons satisfied his own mind that there was a sufficient prospect of success to authorise the attempt. But when he communicated his ideas on this subject to Sully; that minister (though in many respects a great man) could not view it in the same light: he considered it only as one of those unfounded whims which ought not to be indulged; and strenuously opposed it as long as he could, being fully persuaded that the attempt

must ultimately prove abortive, and thus tend to lower the character of his much esteemed sovereign in the eyes of his people. Henry, however, was not discouraged by this opposition: the trial was made, and happily succeeded; in consequence of which silk has been the staple production of the southern provinces of France for more than two hundred years past; and will probably continue so long as France shall be a nation.

But it is not necessary that we should go from home in search of examples of the many obstacles to useful improvements which derive their origin from the sources above stated. We are all at the present moment fully convinced of the inestimable value of the potato as an article of food in this country; and are satisfied that no improvement in modern times can be compared with that of the introduction of this plant into general culture in Britain. Of these facts, I say, we are now convinced: but how long is it since our minds were thus enlightened, and to whom do we owe this salutary improvement? It is neither to the exertions of the philanthropist, nor the speculations of the philosopher, that we are indebted for this blessing; but it is by the labours of the poor, and the feeble exertions of indigence alone, that those prejudices which blinded the understanding of the wise have, after the lapse of two centuries, been happily removed. With a view to moderate the vanity of those who pride themselves on the extent of their intellectual powers, it may not be amiss to give a hasty glance at the progress of this improvement.

It is well known, that sir Walter Raleigh first in-

roduced the potato into Britain during the reign of Elizabeth. It was reared in the garden of Gerard the herbalist, and some other curious botanists in those days, and was frequently described by them with all that luxuriance of panegyric which the possession of such a valuable esculent would naturally inspire. Yet neither these descriptions, which we now know to have been absolutely just, nor the presents of the plants, which were liberally distributed by those men among persons of high rank wherever they thought they would be valued, were sufficient to recommend them to attention. The plant was suffered to fall into universal neglect; and nearly two centuries were allowed to pass by without any farther notice of it, than an occasional mention of its name as of other exotic plants of little or no importance. Fortunately, it is one of those plants which, if once introduced into a place, is not easily eradicated. Among other refuse articles, some of these bulbs had probably been thrown out into a waste corner near some garden in Ireland, where they had been picked up and carried home by children, and roasted among the ashes. The delicacy of these bulbs must have appeared so great, to persons who were not accustomed to luxurious fare, as strongly to attract their notice; they would, therefore, be picked up with care, and some of them preserved for planting in their little garden. The delicacy of the food, and the paucity of the plants that it was in their power to obtain, would naturally insure a careful culture; and an abundant produce must, we know, have been the necessary result. Thus the poor family would find themselves possessed of a large supply of a palatable

and nutritious food, which could be afforded at a smaller expence than any other that was within their reach. The culture of it would be of course extended: neighbours under the same circumstances would be glad to participate in the boon; and thus, without bounties or premiums of any sort, without harangues or puffs in a newspaper, or laboured panegyrics of any kind, the culture of it would silently make its way. Every individual would indeed know from whom he had received the first seeds; but no one would think of tracing it back to the source from which it originally came: but it is well known, that the culture and use of this plant had thus become very general among the poorest classes of the people in Ireland, long before it came to be generally known in Britain. From them it passed over to Scotland; and the man has not been dead many years who first introduced from Ireland the culture of the potato into the peninsula of Cantire in Scotland; he lived near Campbelton. From him the city of Glasgow obtained a regular supply for many years; and from him also the natives of the western highlands and isles obtained the first plants, from which have been derived those abundant supplies on which the people there now principally subsist. Being once known at Glasgow, the culture soon spread abroad; but so lately were they introduced as a field crop in the east of Scotland, that I myself remember the first field that was planted with potatoes in that neighbourhood, which was only five miles from Edinburgh. The culture of it was introduced at a later period in other parts of Britain, from whence it has been gradually diffused to France, where

this root is still a sort of rarity; and to other parts of the continent, in many extensive districts of which it is at this hour scarcely, if at all, known.

Thus has this valuable esculent been happily introduced into Europe by the exertions of the poorest and the most despised of the people; not by the wisdom of the wise, nor the liberality of the beneficent, by both of which classes of men it was equally neglected. Fortunately the plant needed no preparation that was beyond the resources of the most indigent to render it fit for food, otherwise it must probably have been suffered to remain in a state of perpetual neglect. Had it even required nothing else but the simple and common operation of grinding, it is more than probable that it never could have forced its way into general notice; for the poor man who might raise a handful could not get that ground, so that to him it must be lost; and the wise and wealthy, who could afford to raise a quantity sufficient to be grinded, would never think of making such an exertion, lest it might not turn out a profitable speculation; as the poor, for whom it was intended, cannot afford either to give a high price, or to buy it in quantities if they would; nor can they be expected to buy it at all, until the qualities of it shall be known to them. It is in this way that the most trifling circumstances often prove insurmountable bars to the progress of improvement; and the world is for ages deprived of blessings of great value which might have been effectually secured by a very small and trifling exertion, if directed by knowledge, and insured by that steadiness which wisdom alone can bestow.

It is probably owing to circumstances of this kind that the world has been so long deprived of the benefits that might have been derived from the fruit of the beech-tree. This fruit is well known in every part of Britain, being a triangular nut, of the colour and consistence of a chestnut, but of a smaller size. It is covered also like the chestnut, with a smooth, firm, though flexible coriaceous shell-like covering, and that again is inclosed in a thick parenchymatous prickly husk, which bursts open, like that of the chestnut when ripe, and allows the nut to drop out. This nut is technically called *mast*, or *beech mast*; and, though the taste be not unpleasing to children, who sometimes eat them; yet they abound so much in oil as not to please the palate of grown people in general, on which account they are for the most part abandoned to hogs in the woods, who search for them with care, devour them with avidity as acorns, and quickly fatten upon the nutritious food.

It is not, however, generally known, that from this nut an excellent oil can be extracted, which is little, if at all inferior to that of olives; and that, after the oil has been extracted from it, the marc, now dry, becomes much more sweet and palatable than before, and may be easily converted into flour, not inferior in taste or colour to that of wheat, and which can be made into bread of an excellent quality, or employed for every other purpose to which the flour of wheat can be applied. This nut was in much greater estimation as food for man in ancient than it is in modern times. Pliny (liv. xvi. c. 5) thus characterises it. *Dulcissima est omnium glans fagi*; and my au-

thor thinks, from the name *φαγος*, which signifies a thing that may be eaten, that it had in old times constituted a principal part of the food of the original inhabitants of Europe, and which they probably would never have abandoned had they been acquainted with the singularly economical mode of purifying it by extracting its oil. Be this as it may, I shall present my readers with the following facts respecting this substance, extracted from an elaborate dissertation, which was published in the twenty-second volume of the *Memoirs of the Royal Academy of Sciences of Berlin* for the year 1766, written by *M. de Francheville*, a distinguished associate of that celebrated body.

He assures us, that in Burgundy, Champagne, Picardy, and several of the other northern provinces of France, the inhabitants have been long in the practice of using this oil for every culinary purpose, almost to the total exclusion of oil of olives of any sort. "The first time," says he, "that I tasted the oil of beech-nut, was in the month of February 1728, at *Villers Cotereux*, a neat city in Soissons, which belongs to the family of Orleans. The principal persons of the city, among whom I lived for eight days, assured me, that for the most part they never used any other oil for the table; and that all the city had constantly used it for time immemorial; a convincing proof that no bad qualities could be ascribed to it. This oil, if fresh, properly made, and well preserved, is scarcely, if at all, inferior to good olive oil: it is of a pale amber-colour, clear, without smell, differing from the virgin oil of Provence only in this, that it discovers a small greenish tint, and when it is not

perfectly new, it appeared to me to have somewhat of a particular flavour, which became harsher with age; but the people of the place were not sensible of this." The same thing happens to oil of olives when it gets old, unless it be very carefully preserved.

My author states the following circumstances as necessary to be attended to, in order to obtain a pure and good oil. First, that the fruit be chosen with care, so as to avoid musty, rotten, or tainted nuts of any sort, particularly those of the former year, which may have lain under the tree till they became spoiled, and then get mixed with the new. These, he says, may be picked out by children; and he gives directions for distinguishing them. A more certain, as well as more economical way to avoid this evil would be to cause the ground all under the tree to be carefully swept just before the nuts begin to drop out of the husk, and thus to clear away all rubbish and impurities of every sort.

In the second place he recommends that the skin or shell of the nut should be taken off, which, he says, is necessary not only for augmenting the quantity, but also for improving the quality of the oil, as this husk, he observes, communicates to it a particular flavour: it may be added, that if the marc is intended to be employed afterwards as food for man, this operation becomes indispensable, because that skin would be utterly indigestible. He says, that this operation also may be performed by children; but, if ever it were to be attempted on a large scale, it would seem to be much more eligible to have it done by a mill, the stones of which were set to a proper width for

this purpose, as is done for splitting beans or pease. The skins might then be separated from the kernels by winnowing.

Thirdly, the inner skin, or film which surrounds the kernel, should then be taken off. This seems to be an essential operation, both for the sake of the oil and the flour; for this film, though small in quantity, has an austere kind of styptic taste, which is plainly perceptible in both the oil and the flour, where that operation has been omitted. It is this kind of styptic *taste* which renders the dry nuts unpleasing to those who taste them. This film, he says, may be easily separated, by putting the kernels into water scalding hot, as is practised for blanching almonds.

The fourth particular that it is of consequence to advert to, is the time when the nuts should be put under the prefs. They ought not, he says, like olives, to be put to the prefs as soon as they are gathered, for in that case they will yield a much smaller quantity of oil than if they be kept for the space of two or three months; but they ought to be preserved during that time free from damp, so thinly spread out as not to allow them to heat, and frequently turned, to keep them perfectly sweet.

These circumstances being attended to, the fruit, when the limited time approaches, should be bruised like apples in a cyder-mill, or by any other means. The marc should then be thrown into bags of strong though open canvas, of a proper size, and put under the prefs cold. The oil should be extracted by three degrees of pressure: the first moderate, which gives the purest and finest oil; the second harder, which gives

oil of an inferior quality; and the third as great as the materials can sustain, which yields an oil of a worse quality still. The bag should be taken out after each separate pression, and turned, the marc being first well shaken in the bag. These should be kept separate, and preserved for use. I find no information, however, respecting the proportion of oil that these nuts yield.

My author mentions another mode of obtaining this oil, of which he greatly disapproves; this is, to boil the fruit in water, when, he says, the oil parts from the pulp, and floats at top, where it may be skimmed off. This oil, he tell us, is of a very inferior quality; and we should suppose that it would be afforded in very small quantity also; for I know of no other instance of an expressed oil being thus obtained from any seed. Linseed and coleseed, which so much abound in oil, do not yield any of it when treated by coction; so that I suspect he must have been misinformed as to this particular. Could expressed oils be thus extracted, and in as great quantity as by pressure, it might on some occasions be economically employed for the purpose of making soap: but of the practicability of obtaining it by this process I very much doubt, for the reasons above stated.

“ It now remains,” proceeds our author, “ that we should take notice of the uses that may be made of the marc after the oil has been extracted from it. This marc, three times pressed, has become more nutritive than the nut was in its primitive state; for, whether fresh and humid as it comes from the bag, or dried so as to admit of its being kept for future

use, it may be given to fowls, to pigs, to oxen, and to cows, and is for all these animals a wholesome and a palatable food, which fattens them wonderfully, without rendering their flesh soft and flabby, as the crude nut itself is known to do. Nor is this all, nor even the best use that can be made of it. If this marc be spread out in the sun, and so dried as to evaporate its moisture, then ground in a flour-mill and bouted, it becomes a flour proper to be made into bread, like the Cassava root of America after its poisonous juice has been pressed from it. You may, if you choose it, mix this with wheat flour for bread; it will not spoil it in the least: but this mixture is by no means necessary, bread of the beech flour unmixed being of an excellent taste, fine colour, and in no respect hurtful. Of what inestimable value then is this resource in case of famine! But, as man lives not by bread alone, this same beech-marc furnishes something still more delicate; as it comes from the press, if it be moistened with milk, and put into moulds, it becomes a kind of cheese (*fromage*), [this must be a peculiar dish so called, with which I am unacquainted, and concerning which I will be glad to have such information as any of my readers who knows it are capable of giving], as good as that which is made in *Bourgogne* and *Franche Comte* with the marc of walnuts after the oil has been extracted, and there accounted a great treat by those who obtain it. To conclude, the same beech-marc, made into cake with eggs and milk, affords another delicacy on which our forefathers may have formerly regaled at their grandest entertainments:

it may be also employed for hair powder, a luxury which, in all probability, they did not know."

My author then proceeds to ask, if these benefits may be derived from the nut even in its wild and uncultivated state, who can tell to what amount benefits might have been derived from it had it been properly attended to as a *fruit-tree*, and improved by means of judicious budding or grafting for a sufficient length of time? An important remark, that ought not to be passed over lightly. I took an opportunity on a former occasion (Vol. I. Natural-history, page 93, 4), to observe, that there is good reason to believe, that no two trees which are reared from seeds are precisely like each other in all respects; nor do they in any particular differ more from each other than in what regards their fruits and seeds. The differences between different plants of those kinds that produce succulent fruits, which in their native state may be eaten by man, are indeed so great and so striking, as of necessity to attract his notice in every part of the world, and in every stage of civilization; but it is only among those people where civilization has attained a considerable height, that the art of perpetuating these accidental varieties, by means of grafting or budding, is fully understood: nor does it appear, that we have yet carried that art to any thing like the perfection of which it is susceptible. I shall, therefore, beg leave here to throw out some hints tending toward a farther elucidation of this subject.

We all know, that if a particular kind of apple (a codling for instance) be budded or grafted upon an

apple stock of any kind, the fruit that will be yielded by that tree in future, if the graft have succeeded, will be inevitably of the nature of the codling. Many people are also aware, that if the seeds of apples of any kind be sown, the plants which spring up from these seeds, if allowed to stand for a proper length of time, will at last produce fruit of the apple kind; but that these apples, instead of being all of the same kind with that in which the seeds were ripened, will be greatly different from each other, and from the parent fruit; so that perhaps among many thousands there will not be two individual apples of the same kind, nor one of them that in all respects resembles that from which the seeds were taken. Among these seedling apples there will be very striking diversities, most of them being small, austere, and unpleasant, but differing in these respects in many particulars: some will be as hard as a piece of wood, others soft and spongy like a turnip; some red, others yellow, green, grey, and so on; some will taste sweet and insipid, others acerb and austere; some will appear that carry their fruit in abundant clusters in every season, others that yield it only in small quantities, and that in the most favourable seasons only. In short, the diversities in this case are endless; and, although it never fails to happen in experiments of this kind, that almost the whole of these apples are of such an inferior quality as neither to be fit for the table nor the orchard; yet it sometimes occurs, that among these wildings one makes its appearance which in size, flavour, and other qualities, is perhaps superior to any that have been cultivated by us. When this lucky hit takes place,

scions are taken from that tree to serve as grafts to perpetuate the kind. It is by a process similar to this that all the valuable kinds of apples, pears, plums, apricots, nectarines, cherries, and vines, that are cultivated in European gardens have been originally obtained; and it is from accidental discoveries of this sort in neglected corners, where the wildings are suffered to run to fruit from neglect, that we derive those additions to our stock of cultivated fruits which now and then take place. From the paucity of these valuable additions, however, some judgment may be formed of the small proportion of good fruits which are thus produced, when compared with the bad. The probability is, that before one apple, equal in quality to any one of our best apples, could be obtained, several millions of inferior sorts must have been produced. We, who have been accustomed from our infancy to see trees cultivated by means of engrafting, are apt to overlook the great benefits which we derive from this circumstance; but if any one will attempt to compute the value of the fruit yielded from an acre of ground planted with suitable fruit-trees of kinds properly selected, with the produce of the same field if it were to be planted with wildings as they spring from the seeds, he will be confounded at the immensity of the difference. If it be for table-fruit, I do not suppose it could be less than several thousands for one; and even for cyder it would perhaps amount to some hundreds.

Now, as a diversity of the same kind, though perhaps in an inferior degree, takes place in regard to the quality of nut-bearing trees, it must be obvious,

that wherever the fruit constitutes the value of a plantation, it must greatly add to that value if such trees alone are planted as yield the best fruit of those kinds; but where no selection of this sort has ever been made, this cannot be done, and consequently the value of the plantation must thus be greatly diminished. As no selection of this kind has ever yet been made in regard to the beech-tree, it must follow that the value of any plantations that have ever yet been made can only give a very inadequate idea of the benefits that might be derived from this source, considered under this point of view. Yet poor as this produce is, compared to what it might be, we are even now in possession of facts sufficient to show that it ought to be regarded as an object of great national importance. I suppose that no man, who has had an opportunity of observing the produce of a full grown beech-tree of a prolific kind, will make any hesitation to allow that it will be no exaggeration to say, that such a tree will afford about eight bushels of mast in ordinary years; of course, five such trees will equal in quantity the produce of an acre of good wheat. But as these trees yield their fruit for many years together without either seed or labour, and as they will grow upon land of a much inferior quality to that which is necessary to produce wheat, and without doing much injury to the grass, it is very obvious, that if grafted trees of the best sort only were planted, instead of wildings as at present, the benefit that the nation might derive from this source would be incalculable. For, independent of the value which might be drawn from the oil, of which I can make no adequate calculation,

and without taking into consideration the relief it might give in such years as the present as a food for man, the addition that it would make to the quantity of food for beasts, and in particular the saving that might be derived from this source in the quantity of corn for horses (there being little reason to doubt that it would prove a very nutritive food for that animal), are considerations that ought to make a deep impression upon every attentive mind.

Let those persons who are disposed to make light of the proposal for engrafting trees of this sort examine the individual trees in any park at the proper season of the year, and he will soon remark a much greater diversity in regard to their prolificacy, and other peculiarities, than he has been accustomed to think had hitherto existed. Let him examine also, if he please, the fruit of the different plants in a hawthorn hedge, wherever it occurs, and he will find occasion to make the same remark. There is, in short, scarcely a tree or a shrub any where to be found, if these have been reared from seeds, where he will not be struck with individual diversity of appearance whenever he examines them with the requisite degree of attention.

Allow me to add one other instance of the benefits that may be derived from an accurate attention to the particular varieties of fruit-bearing trees. Mr. Tournefort, in describing the singular operation called *caprification*, practised among the islands of the Archipelago for bringing to maturity a particular variety of the fig-tree there universally cultivated, takes notice of a wilding fig which, though a very necessary af-

sisant in the process of caprification, carries not any eatable figs itself. He farther remarks, that the fruit-bearing fig itself, which is there cultivated, is not possessed of a flavour that can be in any respect compared for delicacy with those which are cultivated in the south of France, Italy, and Spain. On asking the natives of those islands why they did not cultivate this better sort, which they well enough knew, they informed him that, as their figs constituted a principal part of their subsistence, it was of much more consequence to them to have an *abundant* quantity than a few of a more delicate flavour; and as one of the trees of their own sort yielded *communibus annis* about two hundred and eighty pounds of ripe fruit, whereas a tree of the fine sort would scarcely produce twenty-five, they were therefore induced to prefer the former. At this rate it appears that *eleven* times more fruit may be obtained from one variety of cultivated fig than from another, while none at all could be obtained from the wilding. We have thus only to open our eyes to perceive the benefits that man may derive from an attention of this sort if he chooses to bestow it.

One who had not been accustomed to observe the general inattention of mankind with respect to obvious facts, would be surprised to find, that in a nation like this, where the utility of propagating the succulent and pulp-bearing *engrafted* fruits had been so long and so universally recognised, should not have more generally suspected than they seem to have done, that there might be some analogy between these and the nut-bearing trees. The natives of this country are

very fond of chestnuts, and many tons of this fruit are annually brought hither from Portugal, Spain, and France; yet there is no tree that thrives better in this country than the chestnut, though its fruit is a great rarity among us. We content ourselves with blaming the climate in this as in many other instances, without opening our eyes to other circumstances. There are thousands of people going and returning every year from Portugal, where the chestnut forms the principal food both of men and horses for a considerable part of the year, any one of whom could inform the inquirer, that a Portuguese would be as averse to plant a wilding chestnut, as we would be to plant a wilding apple in our gardens. The native of Portugal knows, that in that case, though the tree might prosper abundantly, as it does in England, yet it would also be, as it is here, in a great measure sterile: but as it is for the fruit, on which in a great measure his subsistence depends, that he cultivates it, he takes care to obtain plants of the proper fruit-bearing kind. Whatever judgment, therefore, we may form respecting the beech-tree, there seems to be no reason to doubt, that were we to plant, in the southern parts of this island especially, abundance of the fruit-bearing chestnut, instead of the wildings which we now so liberally propagate, it would tend greatly to augment the proportion of food both for man and beast, and diminish that importation of the necessaries of life which has of late increased to such an alarming degree, and which no thinking man can observe without disquietude. Perhaps, after the introduction of the potato, no improvement that can be named can promise to be attended with such extensive benefits to the community.

THE very intelligent and obliging letter of *H. G. H.* is received, together with the specimens of Caramanian wool, for which the Editor begs leave to return his best thanks. Of this there are three kinds, white, pale red, and dark red. These are all mixed with the kind of dead hairs called *kemps*, and more resemble Vigonia wool in the staple than any other I have seen. This was formerly, he says, a valuable article in the manufacture of hats, but of late years there has been wool imported from South America unmixed with hairs, and of a finer quality, which hath greatly diminished its value. The following paragraph in this letter shows in such a striking light the precarious nature of that kind of trade which depends upon the crude materials for manufactures alone, that I shall give it entire.

“ The Caramania wool was a regular article of import, via Bombay, by the East India Company, until about seven years ago, that a civil war in the province whence it comes totally stopped the trade in that article for some years [which, no doubt, was the cause that the public tried to supply the want from another quarter], and the little that has arrived in Europe since has been almost entirely shut out of the market by the superior fineness and condition of that from South America; and now, being a losing article to the importers, it is likely that it will hereafter cease to be an article of commerce. The following account of the prices may serve to give some idea of the value of this article, and the fluctuations to which it

has been subjected from the operations of particular causes."

	s.	d.	s.	d.	s.	d.	s.	d.
From 1729 to 33.. Red	4	7	to	8	0 lb.. White	3	7	to 7 5 lb.
..... 1733 to 42.....	2	3	to	4	5	2	5	to 3 4...
..... 1743 to 49.....	5	4	to	11	2	4	10	to 10 6...
..... 1750 to 53.....	12	4	to	14	7	11	7	to 13 6...
..... 1754 to 57.....	7	0	to	10	6	4	6	to 9 8...
..... 1758 to 90.....	4	6	to	7	7	2	5	to 7 1...
..... 1791.....					Mixed	6	8	to 9 0
..... 1794 to 95.....						3	1	to 8 7
..... 1796.....						1	4

The Editor has heard of the goats this correspondent mentions, of which some account has been given in the last number.

British Mineralogical Society.

The Editor regrets that the pressure of other matter prevented him from sooner taking notice of the plan of the British Mineralogical Society, to promote whose aim he would gladly afford every assistance in his power. It would take up too much of his room to specify the particulars of their plan in his work, but if they will cause it to be printed in a proper form, and furnish him with a sufficient quantity, he shall cause them to be stitched up with one of his numbers free of expence to the society.

Tyro, with much politeness and becoming modesty, wishes to have the opinion of the Editor respecting the best method of constructing a hot wall he proposes to build. In these circumstances it would be disingenuous in me not candidly to say, that I never recommended that mode of applying artificial heat for promoting vegetation under any possible modifi-

cation of circumstances, from many powerful considerations. In the first place, the expence of such a wall, considering the price of bricks as loaded with a heavy duty, must be very great; for, as the flue must be made wide enough to allow it to be cleaned by a boy (or it will be in danger of being closed up with soot), the thickness where it must be solid will swallow up a vast quantity of bricks. The heat, too, which is produced is in a great measure lost for the purpose wanted, because, of the four sides of the flue that must be heated nearly to an equal degree, only the south side of it can produce any sensible effect upon the fruit-tree; and even on that side the effect upon the tree must be very inconsiderable, because the constant pressure of the cold air from without must force the heat that comes through the bricks to be drawn upwards close to the wall as soon as it is produced, and thus carried off with amazing rapidity, and with scarcely any sensible effect upon the tree, unless where it actually touches the wall. Under these circumstances the waste of fuel must be so immense, as to render it in every case ineligible where glass is employed. Under the modifications of which it is easily susceptible there can be no doubt but *one thousandth* part of the fuel would produce a greater effect; as I shall be able to show when I can overtake that subject, which I propose to treat more particularly than has yet been done. On that occasion *I. H. B.* will have an opportunity of perceiving that he has found difficulties by only running a little too fast, and supposing cases that never have been approved, far less recommended by me.

In answer to *Tyro's* question respecting the propagation of thorns by sowing or planting the roots, though it will succeed in a few cases, and under particular modifications, yet I think it unnecessary to enumerate them here, because I conceive it never can be of much utility. The best way of raising thorns is doubtless from seeds. The author, he quotes deserves much commendation in many cases; but in some instances he was carried off by a particular bent of mind peculiar to himself; and this is one of them.

The same correspondent complains of want of skill in cow-leeches, and much regrets that the diseases of cattle are abandoned to the care of such persons, and wishes to be referred to a good treatise on that subject. Such a work is still a desideratum in Europe; and is, I fear, likely to continue such. Perhaps some useful information might be drawn from observing individuals who have had experience in particular cases, were these individual cases distinctly and accurately stated in a publication such as this, and information requested. Should such cases or queries be sent to the Editor, he will endeavour to give them all the publicity in his power.

The Communications of *Ignotus*, *Agricola*, *H. G. H.* *J. H. B.* *A constant Reader*, *N. L. Observer*, &c. are received, but unavoidably omitted for want of room. For the same reason we are obliged to postpone the insertion of the continuation of the *Efsay on Gothic Architecture*, the account of the *Tinea Seratella*, the *Efsay on Historical Composition*, that on *Scotticisms* and *Anglicisms*, and several others.

RECREATIONS, &c.

N^o 12.

AGRICULTURE.

As the following remarks may be considered as a supplement to what has been said in this work on the varieties of sheep, it here occupies its proper place. Practical remarks, when they are the result of attentive observation, conjoined with a sound judgment, unbiaised by predilections, I consider as the most valuable kind of communications that I can ever receive, and shall prize them accordingly.

MISCELLANEOUS REMARKS ON SHEEP AND WOOL.

To the Editor of Recreations in Agriculture, &c.

SIR,

Somerset, January 6, 1800.

I HAVE derived great pleasure from perusing the different numbers of your publication; but more particularly Number V and VI on natural-history, wherein you combat the celebrated Mr. Bakewell's system of breeding, with respect to what he called "perfect form:" and, though I am disposed to pay every tribute that may be due to his memory for the benefits which he has rendered to the community by improving the breed of cattle, and being instrumental in raising a spirit of emulation in this laud-

able pursuit; yet, *as to this particular*, the observations which my experience has enabled me to make oblige me to throw that weight into your scale. With respect to sheep, the origin of my flock, when I commenced farmer, about twenty years ago, was high Wiltshire ewes (with long smooth faces, and bellies bare), which, not being accustomed to small inclosures, got over the hedges from one field to another. This induced me to cross them with a low ram of the *old Dorsetshire* breed (with much wool about the face, belly, and legs); but, finding the descendants of these possessing the same disposition to break from field to field, and having heard that the *Leicestershire* sheep introduced into this county were remarkably quiet in any inclosures, I determined to cross my horned ewes with one of these rams, notwithstanding the prejudice that was raised against them on account of their *not carrying so much fat withinside* as some other sheep; and I was the more disposed to dispense with this requisite in them, because my sheep excelled in this particular property.

These horned ewes carried from two pound and a half to four pound and a half of close fine wool, whereas the *Leicester* ram carried upwards of ten pounds of long open wool. The produce of this violent cross* was sheep with various sorts of wool; some with perfect horns, others very imperfect, and a few without any. There was also a great variety of sizes,

* So I call breeding from a blood horse and a carting mare; in which case, the produce seldom, if ever, partakes of the properties of male and female in an equal degree; the reason of which may, perhaps, be the subject of some future observations.

and more so of awkward form and appearance, which gave occasion for a seafaring acquaintance to say, that I was got on the "wrong tack;" for I had horned sheep with long open wool (the staple ten inches long), separating on the back, and hanging down in wet weather almost to the ground; some with curled wool of a peculiar glossy appearance; others with wool appearing to be twisted; and a few only with close short wool. As, however, I found them all superior in proof to the original horned sheep that I had of a more perfect form, I determined to persevere, by putting these ewes to another Leicester ram carrying shorter and closer wool; which produced sheep more handsome, and a greater proportion of them without horns.

I have continued to the present day to breed from the descendants of these horned ewes, preferring those of *equal proof* without horns, and occasionally hiring or purchasing a ram possessing qualities (either in wool or carcase) to promote the object that I had in view; so that I have not at this time a horned sheep in my flock. My first object has ever been, to be particularly careful in selecting such males and females as shewed a tendency to *fatten quickest, and at an early age*; with some regard to form, but more to *small bone*; a leading characteristic of *high and early proof*; for, if one breed of sheep will get as fat at one year old as others at two years, the superior profit must be obvious to every man. As to form, it has happened to me to have two ewe lambs (from a well-formed favourite ewe) that had the appearance, when fallen, of a high chine bone, with a fall be-

tween that part and the shoulders; which deformity of a hunch-back was consequently most conspicuous when they were out of condition; insomuch that one of them was, when shorn, in June 1798, the ugliest animal in the shape of a sheep that I ever saw; which circumstance, together with that of her lamb having a hunch-back also, made me resolve not to breed from her again; and I turned her off to fatten. As she gradually got into condition, this deformity appeared less; and when fat, all that hollow between the chine and shoulders was quite filled up, and she became as straight as any other fat sheep. When she was killed, I made a point of seeing her after she was cut down in the back; when the butcher asked me if she had ever received any injury there, that might account for her being so crooked; a circumstance which was so apparent, that it could not escape the most common observer. Yet this sheep certainly *got fatter* than any other fed with her, some of which were handsome enough to do credit to any flock. The twin sister of this ewe, which has also the same imperfection of form, though not to so great a degree, I have at this time, and had turned her off to fatten after she was shorn this last season; but she also having improved so much faster than any of the others that were kept with her, I took her from them, and put her with the ram again to continue her breed; because I am well assured, that the propensity of a sheep *to get fat*, does *not* so much depend *on form* as on a long *uninterruption* of good blood or breed from which it is descended. For, although I am sensible how desirable it is to combine

perfection of form with other requisites, yet I cannot allow *quick* or *early* proof to belong to them as a matter of right; because these two instances, with some others, convince me to the contrary; and I am convinced, that if I had bred “in and in,” as Mr. Bakewell terms it, that is, a ram of one of these hunch-back ewes with its dam, and kept close to that breed, I should in course of time have had a distinct breed of sheep with that deformity; but it would have been too whimsical an experiment, and defeated my object of producing rams that would sell at a higher price than my neighbours; and, though I do not breed from such rams, yet I shall always endeavour to retain ewes of this blood in my flock of a more pleasing form. As to external appearance, I know of no surer index than a *full quick eye, small bone, and a disposition to feed quiet*; which, I believe, will be allowed by every man of experience, observation, and candour. I am aware, however, that there are some whose prejudices will not allow them to give up *large bone* and large size, not considering that two sheep of thirty pound a quarter will consume as much as three of twenty pound a quarter, and that the latter come sooner to market, and are more marketable also, besides affording the consumer more meat of a *superior quality* to a given quantity of bone. I can boast of sheep whose legs have produced *more* than a pound of meat to an ounce of bone, and have many now in my flock that I could undertake would yield the like proportion.

I had intended to have closed my present observations here; but having seen Number VIII of your

publication, on the varieties of sheep, I am induced to make a few others. The sheep that you saw on board a Danish East Indiaman, and whose body was covered with close stiff short hair of a clear nut brown colour, so exactly answers the description of one that I once saw exhibited with some wild beasts, that I should almost suppose it to be the same; if not, certainly of the very same kind, which is evidently a variety of the sheep. The sort of sheep that you describe as being brought from Jamaica, I have never seen; but have heard them represented as sheep from this country, whose *wool* has degenerated into *hair*: but this I have never been disposed to credit; not only because the properties of wool and hair are so different,* but from having seen sheep in some of the northern provinces of America (where the winter is very severe) that were descended of sheep carried thither from this country; and having seen also the same sort originally from this country in some of the more southern provinces, where the medium of heat in summer is much the same as in Jamaica; and I

* The distinguishing characteristic of wool is, that when even the coarsest sort is manufactured into cloth, it thickens in the mill, and forms a close texture; whereas the finest hair will neither thicken nor form any texture, which was the result of an experiment that I know was made a few years since (when wool was very dear) by a manufacturer of coarse woollen cloth, who made the chain of wool, and the ab, or shut, of hair; in which case both the wool and hair were of the coarser sorts: but suppose finer wool and the *finest* hair were to be wrought into a piece of cloth, the part composed of wool would only produce the nap, and be brought to lie any way that the workman was to use his cords, or teazels; the hair would resist the process, and be always erect, giving a degree of roughness to the feeling, that the *coarsest* wool would not produce.

could never discover any difference effected by the climate in the appearance of wool in either case. In short, I am inclined to think that difference of climate has very little, *if any thing*, to do with it; *difference of pasture*, however, will certainly produce some alteration in the wool; because I have taken sheep from a poor country to one more fertile, and the *quantity* of the wool has been increased, but the *quality* reduced in value. That a difference in pasture creates a difference also in wool, is proved by an example in my sheep, which were kept very hard during the severity of last winter; the wool, being stinted in its growth, was not so long as usual, and some of it had the appearance almost of a separation in the staple, where the filament was so weak as to break off on being very slightly extended. This is a circumstance that never occurred to me before; but I am told by clothiers, that they frequently find it when sheep are badly kept in winter, and it very much reduces the value of the wool.

An article of such importance, as the staple commodity of the country, has very much attracted my attention, though but a secondary object to a sheep-breeder (the carcase being the primary one); and I think that I have as great a variety of wool, in a flock seldom exceeding an hundred, as can be exhibited any where; so that my little farm may be styled an experimental sheep farm, having sheep carrying wool from two pounds and a half to thirteen pounds and a half, and perhaps all the intermediate weights; which enables me to speak decidedly on, the superior profit of the long-woolled sheep in rich pasture; for example,

say two pound and a half of short wool at fifteen pence per pound is three shillings and three halfpence, and thirteen pounds and a half of long wool at nine pence per pound is ten shillings and three halfpence. I am aware that it may be said, I take the highest weight; but let it be considered, that it is very possible, by breeding “in and in” with such sheep, to have the whole of equal weight, provided they are kept in such condition that the growth of it receives no check during the severity of the winter months, a circumstance that has happened to me but once in twenty years; so that it requires no extraordinary keeping to continue the growth perfect.

My endeavours have been for some time directed to procuring the *greatest* possible quantity of wool of a *fine quality*, in which I discover a *ne plus ultra*, like the law in mechanics—that what you gain in power you lose in time; so in this case, what you gain in *quantity* you lose in *quality*, and *vice versa*. This observation is not confined to the wool, but extends to the carcase also; for it happens that large sheep with long coarse open wool carry their fat chiefly on the outside; and the lean frequently of a darker colour and coarser grain than small sheep with short fine close wool, which carry a greater proportion of fat withinside (but less with outside), and the lean of a brighter red, and finer grain marbled with fat; it is, therefore, a proper admixture of both sorts, with a judicious selection of *the best varieties* thrown out from them, that can insure a breeder success; to obtain which requires the most unremitting attention, not only to know well all your best sheep, and

of what descent when living, but in seeing them cut up after they are dead, and to breed from the descendants of such only as (to use the butcher's term) "cut up well," to enable you to go on progressively in improvement; for one injudicious cross may cost many years to repair the injury it may occasion, and the life of man is too short to allow of many such errors.

The varieties in sheep are infinite; for nature sports, and you may sport with her; but it is for a strict attentive observer only of her works that can avail himself of the advantages thrown in our way.

If the writer of this should find that it has been thought to merit a place in your useful publication, he may, as opportunity and leisure offer, furnish you with some other remarks that come within the province of

OBSERVATOR.

NATURAL HISTORY.

Some Account of the Seratella Moth.

Admiranda levium spectacula rerum. VIRG.

IN the month of May a small fawn-coloured cylinder may be frequently observed on the leaves of the pear, and occasionally on those of the apple or plum-tree. It is sometimes in an erect, at others in an inclined position, and consists of a substance materially distinct from that of the leaf. At the base of the cylinder may be remarked a small protuberance, on

which it may be moved gently backward and forward, without destroying its adherence to the leaf. Just above this part the cylinder is smallest; towards the middle it enlarges; and from thence tapers gradually to the other extremity. Its length is generally about three lines. It is soft to the touch, and when examined by a single *lens* appears downy, or clothed with minute curled hairs.

If the place of its attachment be accurately marked, it will be found next morning at a small distance, and fixed in its new situation with equal firmness. Its former place on the leaf is distinguishable by a small withered speck about the size of a pin's head, from which the *epidermis*, or outer rind, has been completely stripped. Should any doubt occur, in this case, as to the identity of the cylinder, it may be completely removed by surrounding it with a fine silk thread. On inspecting it a day afterwards, it may be discovered in a different place; and a second impression will remain on the leaf.

When the cylinder is compressed gently between the fingers, from above downwards, a small caterpillar protrudes, with a yellowish body and black head. It may be disengaged from its *nidus* by hooking it on the point of a needle; or by placing it under the receiver of an air-pump, and exhausting the air.

The body of the grub consists of ten rings, or segments, and has six fore, and eight hind feet, the latter appearing, under the microscope, like so many black specks. The manner in which these rings are articulated enables the animal to mount and descend within its habitation.

This is entirely a fabrication of its own, being formed of a woolly substance, which, like other *larvæ*, it *spins* out of its mouth. The animal in question is likewise an adept in the art of *patching*; for when newly hatched, it has no occasion for so large a cell as in a state of maturity. When, therefore, the cell becomes too narrow for its inhabitant, it splits lengthways, or is divided by the teeth of the caterpillar; and the rent is closed with fresh materials. When the insect is stretched at length, and we compare its dimensions with those of the cell, we might be tempted to conclude that the latter was much too short for its accommodation: but if we attend to the peculiar mechanism of the body, we shall find that the caterpillar has a power of contracting within nearly one half of its full size. The cell is of a yellowish brown, or fawn colour, the former tinge being bleached by exposure to the sun and air. When opened longitudinally its *parietes* are of a splendid white, being lined with a very fine silk. At its lower extremity the protuberance occurs, by which it is attached to the leaf.

This protuberance is at first probably inconsiderable, but enlarges with the growth of the caterpillar. Its subsequent augmentation of size may be occasioned by the frequent change of place requisite for the nourishment of the grub, which continually secures it in its situation by a few additional threads. When the animal wishes to remove its dwelling, these threads are gnawn asunder; the six fore feet are exposed; the animal advances to another part of the leaf; and there forms a new attachment between the leaf and its cell.

By this means the protuberance is continually receiving additions of new substance.

But this is not the only cause of cohesion between the cylinder and the leaf. When the air is exhausted from a receiver placed on an air-pump, the receiver is pressed with so much force against the moist leather, that it is difficult to effect a separation. Something of the same kind takes place in the present instance. When the insect contracts its body within the cell, a sort of *vacuum* is produced; and the external air presses the cylinder closely on the leaf. This will appear to be a just statement if we attend to the effect of winds, which sometimes agitate the cell in various directions. If a finger be applied to it on such occasions, the animal instantly begins to ascend, and the cell becomes immoveably fixed.

When the caterpillar is disposed to feed, it brings down its head to the leaf, for the dimensions of its prison scarcely allow it to turn. The head is constantly the lowest part. It consumes so much of the exterior rind as lies within the circumference of the cylinder, taking care to avoid perforating the substance of the leaf, which, by the admission of air, might prove alike fatal to the house and its inhabitant. When the produce of this little area is consumed, it gnaws through the cords of its tent, and pursues its journey. It is not obliged to move a great way farther in quest of a fresh pasture: when the tent is again pitched, till a necessity occurs of continuing its progress.

After two or three stages its migrations are at an end, and it is now prepared for a *metamorphosis*. If,

therefore, two or three specks, like those that have been described, be found on the leaf of a pear-tree, we may infer, to a certainty, that it has nourished a *larva* of this species. At what period it first undergoes a change of form, I dare not take upon myself to determine; but I am inclined to conjecture that it happens about fourteen days after the caterpillar is hatched. It is transmuted into a *pupa* before it quits its cell, and probably continues in this state about ten days: for I have confined, in glases standing over water, leaves with cells upon them, and generally observed the insect about that time.

It is a small nocturnal insect belonging to the genus *TINEA*,* of a brownish colour, with numerous black dots and stripes on the fore wings, which are beautifully fringed with feathers at the *commissura*. The inferior wings are very small, and have a fringe on the margin. The eyes are black, glossy, and large in proportion to the body. What more remarkably distinguishes this insect is, the extreme length of the hind feet, which, like the wings, are fringed at their articulations.

As these legs are nearly twice as long as the body, I am apt to think they were designed, like a pair of oars, to maintain the body in equipoise during flight. Small as the animal may be, nature has not bestowed on it a single lineament in vain.

If we beat a gooseberry-tree during the month of May, swarms of these moths issue forth. Their flight,

* *PHALÆNA (Tinea) Seratella*. Fusca: tibiis posticis, corpore longioribus, barbatis.

Habitat in Pyri foliis, intra cucullum cristatum. LINN. *Syst. Nat.*

in the day time, is by *jerks*; of course they do not fly far at a time, but conceal themselves in the nearest bush. They pair immediately on quitting the cell. The female deposits her eggs not like other insects, in clusters, but singly; and seldom more than one on the same leaf. The first employment of the newly-hatched caterpillar is to spin itself an habitation.—*Vide* GOETZ: *Natur. Menschenleben und Vorschung*.
H.

Additional Remarks by the Editor.

The above account, were it to be considered merely as a matter of curiosity, would prove sufficiently interesting to engage the attention of the reader; but it has a much stronger claim to his notice, on account of the benefits he may derive from a knowledge of this diminutive creature. Though it be so small as to have eluded the notice of most persons in this country, yet their numbers are such as to commit at times most terrible devastations in our orchards. The effect has been felt, though the cause was unknown, and consequently no remedy applied. In this case, as in all other evils whose cause is unknown, gardeners have adopted their very convenient word *blight* to indicate this disease, and a thousand others of a similar kind. Among others who have suffered by this species of *blight*, was Mr. Forsyth of Kensington. He observed, in a particular part of the garden, that all the leaves of the pear trees there for several years together, became blighted at a particular season, and decayed so as to fall off and leave the trees nearly as naked as at Christmas, so that no fruit of any kind

could be obtained from them. As this part of the garden chanced to be pretty much confined by some large trees growing there not far from the wall, he at the first imagined that the disease might, in a great measure, originate from the confined nature of the place, which prevented a free circulation of air there; he therefore cut down some of those trees, and laid it more open. Still the evil continued, which induced him to believe it must be occasioned by the operations of some insect which had escaped his notice. He therefore applied himself to examine the trees with a more particular degree of attention than hitherto. It was not long before he discovered the enemy who had done the mischief. He found the leaves towards the end of May so thickly covered with these small spine-like bodies, as in many cases to leave very little space between them unoccupied. They were even so numerous at some times as not to find room enough upon the leaves alone, in which case they stuck themselves all over the bark of the branches. Thus was the tree exhausted of its proper juices by many myriads of drains all over every part of its surface where it was in the smallest degree tender or succulent. Under the pressure of such a malady the trees became sickly, lost all their wonted vigour, and must, ere long, have perished entirely had he not discovered the cause of the evil. As this insect has not been as yet described by any English nor French writer in as far as I know, it was entirely new to Mr. Forsyth. He carried it to sir Joseph Banks to show it; nor was it known to any of the persons who were there present, so that it was, in regard to him, a new discovery, and he intended

next year to have observed it more particularly than he had done, to give a particular description of it, which he will still do. In the mean while he was a good deal surprised when I read the above description, which perfectly accords in general with his observations, though it differs in a few lesser particulars. He thinks that his insect is, in all its stages, of a larger size than the above. The Kensington phalæna, too, discovers more yellow in its colour than accords with the above description. In short, he thinks he has seen two varieties of the same genus; but they are entirely alike in their habits and mode of life with the above. I wished to have given along with this number a figure of this phalæna; but, though I have applied to many of the best cabinets in London, I have not been able to find one specimen of it. This, however, I regret the less, from the perfect assurance that I shall be able to obtain it in perfection during the course of next summer, when the reader may be assured, if life and health be preserved, that it shall be accurately delineated in this work.

In the mean while it is proper to remark, that from the above stated facts there seems to be little reason to think but the malady may be soon removed. From the circumstance of its continuing to be confined chiefly to the same trees that were originally infested by it, we have good reason to believe that it is an inactive moth, which, like the gooseberry tenthiredo, does not go to a great distance from its parent tree; and, as it is at rest during the day, it gives a good opportunity of then finding it in numbers, and thus admitting of its being very quickly destroyed. It would seem that, as it is

but a very weakly creature taken individually, no method of destruction could be more easy or effectual than that of squirting water upon the trees in great quantities during the day-time, and with the greatest velocity possible, from one of those machines that are now to be found in every garden; by this means they will be beat down in great numbers in a state of stupefaction, when they should be carefully gathered up, and either thrown into the fire, or buried properly under ground, to prevent them from reviving. This operation should be begun as soon as any of these moths can be observed; and great care should be taken to search diligently for them every morning about the time of their general appearance. The moment the first is observed, the operation should be begun; and it should be repeated every day, as long as one of the moths can be discovered. By taking them thus they will not be allowed time to deposit their eggs, so that their numbers will be soon very much reduced; and, if the same care be continued, they will, ere long, be entirely exterminated, from which time forward your trees will suffer nothing by that kind of blight which used to be so destructive.

Every other blight that destroys our fruit-trees owes its origin to a similar cause; they are all produced by insects whose production and increase are encouraged by certain dispositions of the atmosphere, but none of which can hurt at all without the germs of the animalcule being lodged there ready to be called into existence whenever the weather proves favourable to them. The radical cure, then, in every case must consist in eradicating these germs; and how this is

to be best done can only be known by tracing the growth and habitudes of each of these minute insects individually. What a fine field here opens for exercising the industry and ingenuity of my young readers?

MISCELLANEOUS LITERATURE.

Thoughts on the origin, excellencies, and defects of the Grecian and Gothic styles of Architecture.

[Continued from page 293.]

IN continuing to trace the progress of that gradual developement of ideas by which our Gothic architects at length acquired the power of rearing those stupendous structures which will excite the admiration of future ages, we proceed to remark that when our artists had grasped the idea of connecting columns together by means of arches, and of arranging them in rows in opposite directions, they had made one great step towards the attainment of their wishes; but still much remained to be done. They had now, it is true, acquired the power of supporting the roof upon stone pillars placed at a considerable distance from each other; but, as the whole building above would thus be divided into square compartments, open at top, these apertures could only be closed by a roof supported by beams of wood resting upon these walls, so as to be still liable to be consumed by fire; the very circumstance they wished chiefly to guard against.

Soon however they would perceive that, by throwing an arch from each of these columns to that in the opposite angle diagonally across the square, these arches would all meet in the centre, and thus admit of the whole of the apertures above being completely closed with stone. If an arch of the same kind was reared in the opposite side of the same pillar, it is plain it would be equally poised on all sides, so as to have nothing else to support but the weight pressing upon it in a perpendicular direction only. By gradual steps like these our artists were brought at length to form an idea of the possibility of supporting a roof consisting entirely of stone, upon pillars of the same materials placed at considerable distances from each other; and at the same time of giving to that roof an elegance of form and symmetrical arrangement that would prove generally pleasing. But still they were far from having attained the ultimate object of their wishes.

We are often put in mind, when we attempt to trace the progress of any human invention, that man is an imitative animal, and that he seldom has recourse to his inventive powers, unless when necessity compels him to do it. This truth was verified in the artists who demand our present notice, as well as all the others whose progress we shall have occasion incidentally to investigate. They found that the semicircle was the form of arch almost exclusively adopted by the Greeks and Romans; and they naturally imitated that form of arch at the first, as their predecessors had done, without having qualified themselves fully to appreciate either the comparative excellencies or defects of that form of arch when ap-

plied to particular purposes. To this origin we may trace the attachment that our artists discovered to the semicircular arch, which is observable in the earliest specimens they exhibited in the first rude attempts they made to introduce their new system of architecture; for the semicircular arch is now admitted to be an undoubted criterion of the oldest Gothic structures. And as all the structures of this kind were, of necessity, accompanied with a heavy clumsiness of proportions, which a superior degree of knowledge taught the more enlightened artists of an after period how to lay aside, this circumstance has given rise to the distinction of two styles of Gothic architecture, one of which has been called the *old* Gothic, the other the *modern* Gothic, or sometimes the Saracenic, from a notion that it was introduced into Europe by the Saracens. The truth however is, that these are both the same system of architecture, and were introduced by the same artists; the last differing from the first only by those improvements being introduced, which a more perfect knowledge of the principles of their art enabled them gradually to discover, in consequence of long experience and a continued attention to every particular concerning it. That these improvements depended entirely upon a more perfect knowledge of the powers of the masonic arch, and the uses to which it could be applied according to the exigencies of the case, I shall hope to be able to prove in the most satisfactory manner to every one who shall have the patience to attend to the few popular illustrations that follow, tending to explain the general principles of this little understood, though very important

branch of masonry; without being obliged to have recourse to the intricacies of mathematical demonstration, which few of my readers may be supposed capable or desirous of following.

The fundamental principle of what we call a stone arch, by which phrase (to avoid the ambiguity that the name might suggest) I beg to be understood in this place to mean “any aperture in a wall or other building which is closed at top by means of stones consisting of separate pieces, so applied as to preserve the continuity between the opposite sides of the aperture;”—the fundamental principle, then, of such an arch, I beg leave to say, is the most simple thing that can be conceived. It consists in nothing more than giving the stones such a shape as that by means of their own natural gravity, tending to make them all descend towards the surface of the earth, they mutually shall so act upon each other as to keep the whole firm and steady in its place; insomuch that if the pressure be equal on every point of the arch, so as not to admit of any one stone in it being pushed *backward* out of its place, the greater the pressure that is made upon it from above, the firmer the arch must be; provided always that the foundation on which it stands be firm, and the materials of which it consists so solid as not to admit of being crushed to pieces.

But although the fundamental principle of the masonic arch be thus simple and easy to be comprehended; yet in the mode of applying it for the purposes of common life, to individual cases as they successively arise, such amazing diversities occur, as to make it a

matter of no small intricacy to those who have not particularly studied the subject, to perceive the propriety of adopting sometimes one form of an arch, and sometimes another, as the most proper for effecting the particular purpose in view; it will therefore be proper for me here to throw out a few hints on that head, with a view to enable the uninformed reader to form some discriminative notions respecting it.

If an arch consisting of a very small section of a large circle were thrown over an opening, so as to approximate to the form of a straight horizontal line, it is obvious, that the weight of every stone in that arch would press directly downwards, and would have only a very small part of that weight supported by any of the stones adjoining to it. This united pressure then of the whole, would have an uniform tendency to push the stones at either end of that segment of the arch directly outward from each other; and of course, unless a strong resistance were made at both ends, directly counter-acting that pressure, the abutments would be forced asunder, and the arch would fall down. Hence it is obvious, that of all the forms of an arch that can be devised, this is among the least proper to be chosen for connecting together two slender pillars; for, although these might be able to support a very considerable weight when applied on the top of the column, and pressing perpendicularly upon it; yet when that pressure is applied laterally, the pillars have not strength to resist it, and they must of course be made to yield to it.

You may form some idea of the force of the relative actions and re-actions in this case, by the following

familiar illustration. Take between your two hands ten or a dozen volumes of a book uniformly bound, with their backs all undermost; if your hands be pressed firmly enough towards each other, they may be kept in that position as long as you please without falling; but if the pressure be so great as to force your hands in the smallest degree asunder, the whole will fall directly to the ground, even if your hands had been supported by some object that could bear the weight. This, it must be confessed, is but an inaccurate illustration, yet it may serve to convey a pretty clear idea of the necessity of having abutments in this case that are immoveably firm, so as to resist giving way in the smallest degree to the pressure outwards.

Let us now suppose, that instead of the flat segment of a circle, as before, the same opening should be closed by means of a semicircular arch; it is very evident, that in this case the stones nearest the pillar from which the arches spring, will press directly downwards with their whole weight upon the pillar, and that the weight of those above them, in like manner, is supported in a great measure by those below them; insomuch that if all supports in the middle were taken away after the half of the semicircle was built, they would still remain unmoved in their place; and when you come at last to close the arch, the two stones on either side of the key-stone have a tendency to fall upon each other, and the key-stone, by preventing that falling, tends to keep them in their places; so that the pressure upon the pillars, in this case, is much less forcible outwards than in the

former, having a much greater tendency downward than outward.

We are thus led to perceive, that in proportion as the arch assumes a higher form, the pressure outward must be diminished, while the pressure downward upon the pillars is augmented; whatever arch, therefore, rises higher than a semicircle, ought to be preferred to one that is lower than it, where the pillar that supports it is of a slender form, and of course incapable of sustaining a powerful lateral pressure; and the higher such an arch is, the better it must be adapted for this purpose when considered simply under this point of view. But no single arch that can be devised (the catenarian arch alone excepted, and against this form of an arch for the purpose here required, if our artists were acquainted with it, they would very soon have discovered such valid objections as must soon have made them reject it) can be made to rise to such a height above a column as two small segments of a very large circle may be made to do by gradually approaching towards each other till they close at the top. Hence it follows, that of all the forms of an arch that could be devised, where the principal object in view is to diminish the lateral pressure from a pillar, and convert it into a perpendicular pressure, more especially where the weight to be supported above is inconsiderable, that of the segment of two large circles is undoubtedly the best. Such was the reasoning of our artists, and such, no doubt, were the considerations which induced them with one accord to abandon the form of the semi-

circular arch which they had at the beginning incautiously followed, and to adopt that form of arch which so peculiarly characterises all the more perfect productions of this sagacious fraternity. But there were other reasons, which we shall afterwards discover, that still more powerfully operated in establishing the necessity of this choice.

That the reader, however, may be able to satisfy himself, by means of a very simple illustrative experiment, how far the circumstance just now explained ought to weigh in determining the choice of these artists, I shall beg leave once more to refer him to his books. Let him pile up a sufficient number of volumes in two heaps opposite to each other, and at some distance asunder, with their backs regularly towards each other. Let him raise them to a considerable height, both heaps at the same time inclining a little inwards. They will gradually approach, and at last will close, so as to touch each other at the top. These form no unapt representation of two segments of arches supporting each other. Both of these would fall down were it not for the support that the other affords. But what is the degree of force that must thus be applied to keep them from falling inwards; in other words, what is the degree of lateral pressure in this case, compared to the perpendicular? Let a very tender substance be applied between them where they fall together at the top; it will sustain the pressure of both without being squeezed. Put your finger between the two; the pressure is so slight that you can scarcely perceive it. Thus have we got rid almost entirely of the lateral pressure, which was so powerful

in the first instance adduced; instead of which the perpendicular pressure is greatly augmented, and with it the power of the pillar itself to resist lateral pressure of every kind, as we shall afterwards see. Lift up the books now, and you will perceive with what a great weight they press perpendicularly upon the column. It would be unnecessary, I presume, to add any farther illustrations on this branch of the subject.

When two arches of the same sort are sprung from the top of the same pillar in opposite directions, they are such an exact counterpoise for each other, as to press upon the column in a perpendicular direction only; so that under these circumstances no lateral pressure can be experienced. In this manner a row of columns of any length may be made to support a roof, no one of which columns can have the smallest tendency to be pushed out of its place; or an indefinite number of contiguous squares of the same dimensions may be thus closed without occasioning the smallest derangement to the columns by inequality of pressure upon them. But that row of columns, however long, must at length come to an end; and the column at that end, having to support only one arch instead of two, must have its equilibrium destroyed; so that the pressure outwards would be such as inevitably to overturn it, unless the pillar be of such dimensions as that the degree of lateral pressure it experiences shall not be sufficient to overcome the weight of the materials of which the pillar consists. There was a necessity, therefore, for augmenting the size of the terminating pillar greatly beyond the dimensions of those that were required in the inside. This cir-

cumstance gave rise to the external abutments on the outside of Gothic churches, which form such an essential constituent in that style of architecture.

It can scarcely be necessary for me to observe, that a row of semicircular arches, or those even of a flatter form, would balance and abutt each other equally well as those of a higher form, upon the top of each column in the row, were it not proper to remark, that there would have been a necessity of having the external abutments much more massy, and of course more clumsy and inelegant in arches of a flat form, than where they were raised to a greater height. It was not therefore without reason that all those structures in which the semicircular arch was adopted had thicker columns and more clumsy abutments than were necessary, after they abandoned that form of arch; and we shall soon have occasion to observe that this circumstance would have had a tendency to deprive them of some elegancies and conveniencies which they were studious to obtain.

After our artists had advanced thus far, it is very evident that they had it in their power to cover with a stone roof an area of any assignable extent; for by increasing the number of rows of columns it might be made to extend to any distance in length or in width that should be required: but, as all the light must in this case have been introduced at the *end* of each row of columns only, and as all the columns must have stood at an equal distance from each other, the central part of the building, which they wished to be the most superb and conspicuous, would have been the most gloomy and obscure. This form of a build-

ing, therefore, though it had been on some occasions resorted to by the Romans, could by no means accord with the ideas of our more aspiring architects. They endeavoured to find out a way of obviating this difficulty: nor were they foiled in this, more than in many other of their bold and ambitious attempts.

They would easily perceive, after a moment's reflection, that if the rows of columns should be placed at a greater distance from each other in the middle of the building than elsewhere, the free space of the central area would be thereby proportionally augmented; and thus would one of the objects they had in view be obtained: and as the windows could also, in this case, be made larger there *at each end* than elsewhere, the other purpose would also be in *some measure* attained. But, in contriving how this enlargement of the central area could be effected, difficulties would occur that could not be easily removed.

We have just had occasion to observe, that whenever the row of equal arches is interrupted, the pressure becomes unequal upon the column where such break takes place, and its equilibrium is thereby destroyed. To keep it from being thus deranged, our artists found it necessary to erect abutments on the *outside*. Abutments would be equally necessary in the *inside*, where an inequality respecting the superincumbent pressure took place: but abutments similar to those that might be readily adopted on the outside, could not possibly be admitted on the inside, without destroying the whole of the effect at which they aimed. This idea must then, of course, be rejected.

Reflecting upon this subject, it at length occurred

to these acute artists, that it was by no means necessary they should confine themselves to that *form* of an abutment which had first occurred to them, and to which they had hitherto adhered; viz. that of making an additional wall on the outside of the column. This wall, it was obvious, could add strength to the column in no other way than by depositing the weight of the materials of which such abutment consists contiguous to the column, all of which weight must be removed before the column can be suffered to stir from its place. It is further obvious, that as the pressure is chiefly at the *top* of the pillar, it can only be the weight of the materials which constitute the *higher* part of the abutment that can tend to give stability to the pillar; all the materials which constitute the base of the abutment being of no other use than to serve as a support to bear to a proper height the materials that are alone of real essential service in this case. This idea could no sooner occur, than it must operate as a flash of lightning upon the minds of our acute observers, because it opened a wide field of most sublime speculations for their enlarged understandings to operate upon. But let us not be hurried forward too fast; let us follow them with attention, and carefully trace the steps by which these sublime ideas were gradually developed.

Let us suppose, for the sake of illustration, that the lateral pressure upon the top of a pillar, tending to push it out of its true position, is equal to ten hundred weight, and that a wall is reared as an abutment on the outside of that pillar to the same height with the pillar itself, and no more, for the purpose of re-

sisting that lateral pressure. Let us farther suppose, that the materials of which this wall consists are equal to one hundred weight for every foot in height and in length. As the pressure is merely upon the top of the column, let us farther suppose, that the whole ten hundred weight will be required upon the first foot of the top of the abutment before the pillar could be properly secured. Under these circumstances it is plain, that the wall of abutment must be ten feet in length to give the security required. But if the pillar be ten feet in height, the abutment must be so also; and of course the weight of the whole materials in the abutment will be ten times ten hundred, though only ten hundred weight is of any use. Here is a pure waste of nine-tenths of the materials when they are employed in this form.

Let us now suppose, that in consequence of the discovery they had made, they might reason thus. If one foot of the abutment, that gives one hundred weight of the gravity required, be suffered to remain entire, take the next stone from the top of the wall, which is one foot in length, and place it upon the top of the former, this makes two hundred weight; the next stone applied in the same manner makes three; and so on, till the whole ten are piled one upon the other; when the weight of the whole is equal to ten hundred weight; the precise quantity that was wanted to give the pillar its necessary stability. The remaining part of the abutment may now be taken away as useless. These materials alone will now be sufficient to secure eight other pillars, by being applied after the same manner.

Here then we discover the origin and uses of the pinnacle, which, it is to be hoped, will be no longer vilified as a mere useless ornament; but will be considered as a very essential part of the building, tending no less to give stability to the pile, than elegance to the structure. Hence also the origin of a phrase, *pondus addit robor*, which was almost proverbial among philosophers of all sects after the revival of letters in Europe. We shall by-and-by have occasion to point out the farther uses of this indispensable part of the building. Had it been necessary to resist only the lateral pressure of the arch directly *outwards*, the purpose would have been answered by leaving the whole weight upon the abutment itself only; but, as the *diagonal* pressure also must be resisted, it became necessary to lay some part of that weight upon the top of the column itself; and, as they were thus enabled to give a wider base to the pinnacle, and of course less height to produce the same effect, this contrivance was naturally adopted; especially as it admitted at the same time of their giving a greater variety of form and proportions to these pinnacles than would otherwise have been practicable.

It was but a step farther,—and our artists seldom stopped short in the course of their investigations;—it was but a small step beyond the limits they had now attained, for them to ask, what was the necessity for having any abutment at all? Would not the column be equally firm and secure if, instead of having ten hundred weight, or even a greater weight if necessary, applied on the outside of it, the same weight were placed upon the top of the column itself? No

answer to this question, but in the affirmative, can be given. The more it is considered, the more certain it appears. And now the film is removed from their eyes: the grand desideratum which had so long arrested their progress is now obtained. Let us, say they, instead of employing abutments in the *inside* of the church for securing the pillars, where they would prove an intolerable incumbrance, let us suffer these columns to retain their primitive shape; and let us only load them at top to give them the necessary stability. Let us raise a pinnacle above them to the necessary height. But what is the use, say they again, of a pinnacle at all? Is it not possible to load the column sufficiently without making that load assume the form of an upright spire? Nothing is more easy. Let us raise a solid wall to such a height as we shall find necessary above the arches that connect the pillars on each side the nave of the church; and, as in that case the whole weight of that wall must ultimately rest upon that row of pillars, we can thus give them the pressure required, without either incumbering the church in the inside with abutments, or loading it with pinnacles on the outside. This idea no sooner occurred than its utility was instantly recognised, and the practice of course adopted.

When the mind broods long over a favourite subject it gradually expands; every step in its progress confers upon it additional energy, and fresh acquisition of powers. By such a progress they would soon perceive, that if a wall could be raised above those pillars, nothing could prevent them from putting windows into that wall; and if a roof could be thrown

over the nave above those windows, they would then have the body of the church perfectly illuminated, which was the great desideratum that had hitherto stopped their progress. To support this roof, nothing else is required than to spring a set of higher arches from the pinnacle that rises above each column (in other words, from the side wall that these columns support), so as to close the middle area after the same manner as those of the side aisles had been already closed. One only difficulty stood in the way of this improvement, and this also they soon contrived to remove. It became necessary to have an abutment to resist the lateral pressure of these higher arches; and some method must be contrived to effect this. Probably the first idea that would occur on this head would be that of adopting pinnacles; but against this plan several objections would occur. Considering the small base on which alone they could be reared, and the pressure of the large arches, these pinnacles must have been raised to an inconvenient height. This might besides be productive of several inconveniencies; among others, it would lay such a great load upon the slender pillar below, as might risk the bringing it down, should the slightest degree of inaccuracy accidentally take place in the erecting of that pillar. Is it not possible, say they, to contrive an external abutment to resist this pressure, without overloading the pillar, and without altering in the smallest degree any of the arrangements in the structure below? Impossible! No, nothing is impossible to the willing mind. These artists had so often surmounted what others had deemed impossibilities, that they did not

stop here. They soon perceived, that if an arch were sprung from the base of the lower pinnacle, just where it rises above the apex of the lower arch, so as to abut with its apex upon that part of the wall from which the superior arches spring that cover the inside nave, the resistance wanted there would be obtained, without imposing any additional weight upon the columns below. Can you conceive a situation in which loud peals of IO PÆANS would burst with such spontaneous ecstasy from the hearts of human beings, as upon this occasion would be experienced among all the members of this enlightened fraternity?

Such are the origin and uses of those external arches that have obtained the name of *spandrils*, which are thrown over the roof of the lower side aisles, and which, as they support no roof directly above them, have been by many accounted mere uselefs appendages, that ought to be swept away as the idle whims of a set of ignorant artists. It will not be difficult, however, to decide to which of the parties concerned this opprobrious epithet will best apply.

Other particulars still demand our attention concerning these structures, which will be noticed in some future numbers of our work.

On Scotticisms and Anglicisms.

I HAVE met with several lists of *Scotticisms*, which well-meaning persons have selected for the benefit of those who may not have had opportunities of remarking them. This is obliging, and has a tendency to do good: but I have never had the good fortune to

meet with a list of *Anglicisms*, which would not, I imagine, be of less utility than the former. I think, too, that in making out the list of *Scotticisms*, the persons who have taken that trouble upon themselves have not at all times proceeded in the most judicious manner; as they seem, on some occasions, to have put down certain deviations from the vernacular language of the day as *Scotticisms*, which ought perhaps, in strict propriety, to have been marked in the list of *Anglicisms*. As it may afford a not unpleasing recreation to many of my readers to turn their attention occasionally to the subject of language, I shall here throw out a few cursory remarks upon it, in the hope that it may induce some persons who are better qualified for such elucidations to continue them; which, if done in a good-humoured way, may prove generally interesting.

From the list referred to I learn, that it is abominable language to say *butter and bread*, and that if I wish to speak English, I must say *bread and butter*. To this I can certainly have no sort of objection, as it is a mere harmless transposition of words. In like manner, the phrase *paper pen and ink* must be proscribed, and *pen ink and paper* adopted in its stead; and certainly nothing can be more immaterial than this change also. Yet it might naturally enough occur to a person who had been accustomed to admire the elegance that the Latin language acquired, when compared with our own, on account of the variety in the transpositions, which it admitted without risk of confounding the meaning, that it might be an advantage to permit the use of either phrase as occasion might re-

quire, for the sake of variety; and that, instead of increasing that stiffness which our language acquires from the untransitive nature of its construction, they would be glad to adopt any means that could be suggested for loosening those bands which, like the stiff stays of the maids of honour in the days of queen Elizabeth, effectually prevented every attempt at ease and graceful motions, and thus make a small approximation in language to that ease in drefs which gives to the female form in our days those engaging charms which never were displayed in any former period of our history.

On this head, however, I shall not enlarge; but when I am told that I must on no account make use of the word *enow*, and that in its place I must say *enough*, I should beg leave to demur to this decision; and instead of a *Scotticism* used by me, I should say they only laughed at me, and wished to palm upon me a very culpable *Anglicism*, which tended greatly to debase their native language. In support of this allegation, I would say, in the first place, that *enow* is not a Scotch, but an English word, employed by Shakespeare, Milton, Sterne, and many others of our best English classics; and that, in the second place, it could not be laid aside without greatly enervating the language, seeing that it serves to denote a clear specific idea, which cannot be properly expressed by any other word. Let me ask, if you would not admit, that the phrase “*many* houses containing *much* furniture” is clear and unexceptionable language, but which would be greatly debased if it were changed to “*much* houses containing *much* furniture?” This

you readily admit, and justly contend that the word *much* can only with propriety be employed to denote “abundance respecting *quantity*,” while *many* is as finely appropriated to denote “abundance respecting *number*,” and that the one could by no means supply the place of the other. This reasoning is just, and it applies with equal force to the words which gave occasion to these remarks. There was a time when *enough* in the English language as invariably denoted “a *sufficient* quantity,” and nothing else, as *much* now does “a *considerable* quantity;” and *enow* as invariably expressed a “*sufficient* number,” as *many* now does “a *considerable* number;” so that, if the language would now be weakened and debased by dropping the word *many*, and making *much* supply its place, it must be equally debased by dropping the word *enow*, and making *enough* supply its place. Let us then erase *enow* from the list of Scotticisms, and in its place mark down *enough*, when employed to denote *number*, as a barbarous Anglicism which ought to be proscribed.

In like manner the word *more* employed to denote *number* must also assume its rank as an Anglicism tending to corrupt the language, *mo* being the true and appropriate word that was invariably used in that sense by our forefathers; and ought, of course, to be banished from the list of Scotticisms.

It seems to me not a little surprising, that so many of the Anglicisms which have been introduced in modern times should have a powerful tendency to debase the language, instead of improving it; for one can see a reason for changing a word for the *better*, but

it is not easy to perceive what could induce persons endowed with common sense to alter a language, without a cause, for the *worse*: yet that this has been often done with regard to *Anglicisms* of modern date, admits but of too clear a proof. I did not think it worth while to dwell upon the *Cockneyisms* of *wery fine vine*, and terrible *wapid* winegar, or *them there posteses*, or *these here toasteses*, or distinct *idears* (ideas), or small *windors* (windows), because these phrases, and others of the same class, are condemned and shunned by every one who pretends to write. But what shall we say of the common, I had almost written universal practice, even among writers who would deem themselves affronted if they were not put into the highest class, when they tell us “that such a gentleman *laid* in such a bed last night?” If I had been told “that a *hen* had *laid* in such a bed at such a time,” I could readily understand it, as I would know she had laid an *egg* there. It is plain enough, however, from the nature of things, that it could not be an egg which the gentleman laid in the bed; and what else it could have been I cannot possibly divine! It must, therefore, be left to the chambermaid to solve this nice question. I should beg leave to enroll the verb *to lay*, when used instead of *to lie*, as one of those modern *Anglicisms* which tend strongly to debase the language; and should be very happy if it were the only instance of the kind that we could adduce: but there seems to be such a strong propensity to this kind of *refinement*, that it will not be an easy matter to get through the whole.

The word *strait* was for many ages used with a

distinct and appropriate meaning, and could not be confounded with any other word in the language; as in this sentence, “*Strait* is the gate, and narrow is the way, and few there be who find it.” But it would seem that the modern refiners of our language either do not now read the book where this passage occurs, or do not think it worth their while to mind it; for now it is an established Anglicism to use the words *strait* and *straight* as synonymous terms; or at least to substitute the one for the other, just as the whim may strike the writer at the time; of which the following passage (which I recollect to have read in Hawksworth’s voyages) will afford a bright example. Speaking of a particular ship, he says, “she sailed *strait* through the *Straights* of Gibraltar.” I am sorry I cannot refer to the particular page where this passage occurs, not having taken it down at the time; but I am quite certain that I am correct: nor, indeed, is it necessary to be very particular as to this, as a similar phraseology is now very common.

One may speak, even in the present day, of a *sample* of corn without being turned into derision; but were any one to mention a *swatch* of cloth, he would be laughed to scorn as an ignoramus. Should he, in the simplicity of his heart, beg those who laughed at him to favour him with a proper word by which he could indicate “a small piece of cloth that had been cut from a particular web for the purpose of giving an exact idea of the colour and quality of the cloth, without taking the trouble of carrying the whole from place to place,” he would be told that he should call it a *pattern*. ‘A pattern,’ says he; ‘why I thought

a pattern had been a thing that was laid before a workman to let him know what was wanted when he was required to make another of the same kind.' "And so it is," says his corrector, "but do you not know that it denotes the other also?" Formerly, men used to think *that* language the most perfect which had a word to express every separate and distinct idea: but this fashion, it would appear, is now antiquated. Our *English* refiners may say with the French, "*le cœur* lay formerly on the left side of the body, but now *nous avons changé tout cela*;" and this will be called simplifying the language I suppose. It would certainly be a still greater improvement, upon that plan, to banish the word *sample* also; and then our wheat could be sold by a *pattern*, as well as our cloth. By this method the dealers might perhaps evade the law in certain critical cases; for, though they are prohibited from selling their corn by *sample*, I have not heard of any law that forbids them to sell it by *pattern*. As this is a mercantile nation, who knows but considerations of this sort may have been the secret cause of some of those other *Anglicisms* which have appeared to me to be so inexplicable?

It has probably been from the French, who are now so fond of their *rights*, in words at least, that our good people have borrowed the following *Anglicism*, which, if that be the case, should be called a *Gallicism*. However that may be, it is certain that nothing is more common in our day than to hear an Englishman asserting with great vehemence, "that he has no *right* to pay such a claim that is made upon him," in a case in which a person who is uninformed

as to the various modes that have been adopted for polishing and refining our rude and barbarous language, would have believed he ought rather to have said, "the person who claimed it had no *right* to demand it." If a carter were to put the cart before the horse he would probably be laughed at; but it would perhaps be deemed an unpardonable piece of impudence in any one to doubt the long-established and uncontrollable power of the *jus et norma loquendi*, whether it has been founded on the basis of common sense or not!

I am running on, however, at a sad rate, without adverting that I may, perhaps, give offence to some of those sage critics who so much abound in this land of freedom. And here again I find, that I have inadvertently run my head against the post: I shall be told, that to use the verb to *advert* in the manner I have employed it above is a pure *Scotticism*, and that I am liable to the penalty which is annexed to the crime of breaking good old Priscian's head every time that I shall thus use it. Now, as I am of a very peaceable nature, and have no desire to break the head of Priscian or of any person whatever, I should be much obliged to any one who will be so kind as to let me know how I could communicate to another my idea by laying aside that word. "Nothing is more easy," I am told; "it is only to substitute the word to *attend* instead of to *advert*." But I say no. That word does not express precisely what I mean. I fancy, if we had a good dictionary of the English language, it would be found that the word *attend*, in its original and primary meaning, served to denote "the

service which an inferior person was bound to pay to a superior;" from which primary meaning of this verb are derived the words *attendant*, and *attendance*. But in this instance, as in most other cases, we have passed, by an easy transition of the mind, to give the word a collateral meaning naturally connected with the first; and, as it is expected that an attendant is in duty bound to observe with a respectful watchfulness that no command or expression of the superior should ever pass unnoticed, we employ the same word in a secondary sense to denote "that one person is at pains to listen to the discourse of another;" for in that case we would say he *attends* to the discourse. From this secondary meaning of the verb is derived the word *attention*. By another mental process, equally simple as the foregoing, we have come to give the word a third meaning. For, as reading is now become a very common substitute for discourse, a man may be thus said, as it were, to attend to another who is absent as well as if he were present, by not allowing any word that he is reading to be disregarded. But it is plain, that in neither of these senses does the word *attend* express the precise idea that I meant to convey by the word *advert* in the above passage.

"Well then," say you, "adopt the word *recollect* in its stead, and it will answer the purpose completely." Let us try. The primary and original meaning of the verb to *recollect*, if I mistake not, is "to recal the idea of something that is past, something that you once had recognised, but which had now nearly escaped your memory;" but the word to *advert* implies no such former knowledge. The idea

may be now taken up for the first time; it merely denotes, “that the mind is so steadily directed to an object as not to suffer it to pass unheeded at the time, in order that it may be fixed on the memory for recollection in future;” and from this word so employed has been evidently derived the word *inadvertently*.

Perhaps I shall be told that the word *consider* might be adopted in its stead; nor have I the least objection to try if it can. To *consider*, as I understand it, means in strict language “to reflect deeply upon a subject, so as to appreciate its consequences,” being nearly related to the word *to ponder*: but this is not the precise idea conveyed by the word that gave rise to these remarks. The three words *advert*, *consider*, *ponder*, denote three links of the same chain if you will, but differing in degree of profundity. To *advert* means that the object alluded to merely catches the attention, so as not to escape notice; *to consider* implies that it obtains a certain degree of investigation; *to ponder* infers a still deeper and more serious deliberation; they cannot therefore be considered [how could I have used *adverted* here?] as synonymous; nor can they be interchangeably used by any one who thinks correctly himself, or wishes to convey his ideas with precision to another: nor could any thing but inadvertence arising from the general prevalence of that indistinctness of ideas which is the natural consequence of the want of attention to the precise meaning of words have given rise to this species of confusion.

I shall perhaps be told that the word *advert* can never be with propriety employed without the common adjunct *to*; as we also say, *to look at*; *to think upon*;

to hear *of*; to write *to*, and so on; but, because these adjuncts are commonly connected with these verbs, are we from thence to say that we should never use the one without the other? The proposition is absurd. It is also common to say, *to* hearken *to*; but when I call the attention, would it not be absurd to say I could not do it either generally or particularly? The fetters in which we should thus bind ourselves are obvious, when we think of banishing such phrases as “*Hark! I hear the sound of battle!*” Far less should I admit of the propriety of reverting to the literal meaning of the elements, of which a word is composed when etymologically considered, to determine the present meaning of that word. We should then involve ourselves in a labyrinth of inextricable confusion. The words longitude and latitude, derived from foreign sources, and man-midwife, purely English, may serve as illustrations of this. To develop the ideas that have operated in the formation of words is an object of no incurious philological research, though under a very different point of view from that above supposed. Since, then, this word serves to convey a distinct idea which cannot be denoted with precision by any other word in our language; and since the word *advert* has been evidently once an English word, I should be inclined to rank it in the same class with the word *enow*; and, instead of calling it a *Scotticism*, should call those phrases, in which other words are forced to assume its place, pure *Anglicisms*, that have been introduced by that paltry spirit of inconsiderate innovation which hath so much tended of late years to debase and enervate our manly language.

[To be continued occasionally.]

General Remarks on Historical Composition.

The proper study of mankind is man. POPE.

As we shall sometimes have occasion, in the course of this work, to enter slightly upon historical investigations, it may not, perhaps, be amiss, in this place, to take notice of some particulars which, if adverted to, may serve to render those sketches more intelligible, and thus give them a greater degree of interest than they would otherwise have possessed.

Nothing is more common in discussions respecting education, than to hear it observed, that no kind of reading can be so interesting, or so proper for youth, as that of history. This remark has been so often made, and so generally assented to, that it may now be ranked among those wise *saws* which pass current without examination. Why it should be so very interesting, no one gives himself the trouble to ask. It requires, however, but a very slight degree of attention to enable any one to observe, that the study of history is not, in fact, so interesting to youth in general as many other kinds of study. It seems not improper, therefore, to try to discover the cause of so direct an opposition of fact and theory in regard to this particular; which may, probably, lead to a doubt whether the axiom above alluded to has not been too hastily admitted, and to a consequent investigation of the truth of the principles from which it has been deduced. A pretty extensive intercourse in the world has long convinced me, that wherever experience and theory are thus at variance, it is a hundred to one that

the error lies in the theory ; and that, by a proper degree of attention, the fallacy which induced the erroneous conclusion may be discovered.

If we take up the question under this point of view, and seriously ask ourselves, “ Upon what grounds should we expect that historical investigations should prove very interesting to youthful minds,” we shall find ourselves under some degree of embarrassment before we can make a reply. History consists of a gradual developement of the operations of man considered as a sensitive and social being, who is influenced as an individual by certain stimulating sensations, which impel him to exert his active powers; and who, as a constituent part of an aggregate body of other beings endowed with propensities similar to his own, must have these his natural propensities laid under such restraints as to prevent them from interfering with those of others. This produces a complication of interests and a reciprocation of influences, which supposes a degree of knowledge that far exceeds the limited powers of an infantine mind ever to be able fully to comprehend. Now, if the meaning of a narrative cannot be clearly comprehended, it is vain to expect that ever it can prove interesting. Upon this principle I think it fair to conclude, in direct opposition to the above axiom, that historical narratives are not naturally calculated to prove deeply interesting to youthful minds.

For the same reasons we may be led to suspect, that these kinds of investigations cannot prove so very interesting as has been generally supposed to the bulk of mankind, even after they have reached a riper age.

Those only being capable of justly appreciating a picture in which the operations of mind are finely expressed, who have themselves had occasion to feel the effect of similar impressions; it is, in like manner, those persons alone who have previously remarked the power of individual exertions, and traced with a discriminative attention the diversified operations of contending influences upon the aggregate mass, that can properly feel the value of an historical narrative in which these particulars are faithfully delineated. To an individual, whose mind had been thus prepared, such a narrative would become infinitely interesting; but to others it would appear insipid, because unintelligible.

Since, then, historical disquisitions can never prove deeply interesting either to very young persons, or to the bulk of mankind, we can see very good reasons for concluding, that historical compositions of a good kind must ever continue to be, as they hitherto have been, among the rarest productions of the literary world. Men who have talents for such compositions must ever be extremely rare; and those who possess these talents can best feel how very few there be who could ever appreciate their labours, were they to exert their talents for that purpose. This produces a disgust which makes them loath the very idea of putting pen to paper on such a subject. It was this consideration, I have no doubt, that prevented Shakespeare from ever thinking of treating historical subjects, which he, perhaps, of all the men that have hitherto appeared on the globe, was the best qualified to have exhibited in their most perfect light. It was the same

sensation, in all likelihood, that made him despise, as unworthy of any care on his part, those sublime productions of the dramatic kind which, as if in spite of himself, sometimes dropped from his pen. Shakespeare, while other dramatic writers of a meaner cast were at the utmost pains, by printing their own performances, to prevent a single word that they did not approve from being introduced into their works, or even a syllable being put out of its place, with the most contemptuous indifference allowed his writings to be buried under those heaps of rubbish, which any one who pleased might mix with them *ad captandum vulgos*.

As it has thus happened, that those men who were best qualified to write history in a proper manner have declined the task, they have left the field open to an inferior class of literary labourers, who, being incapable of perceiving the arduous nature of the task, have felt no diffidence when they engaged in it; and not being capable of writing for the judicious few, they have studied to captivate the many by such metreticious graces as fashion might recommend, or the spirit of the times for a moment authorise. It would afford no unpleasant amusement, for a person who was properly qualified, to display with a sufficient degree of vivacity the various devices that have been adopted by writers of this class to recommend their respective performances to the notice of the public. In this particular, at least, they have discovered no inconsiderable degree of ingenuity. It is not, however, our intention to unfold the treasures of this ingenuity at present; hoping that it may afford a pleasing

subject of recreation to some of our lively correspondents in future.

Since, then, there is so little reason to hope that we shall soon meet with a man who is both able and willing to furnish the world with a proper historical work of considerable extent, those who wish to attain any tolerable notion of the state of society in former ages must, we fear, content themselves in future, as they have been obliged to do in times past, with the scanty lights that may be occasionally afforded by attending to those short dissertations which ingenious men have sometimes taken the trouble to write on particular periods; and which, embracing a much smaller number of objects, do not require such a commanding perspicuity of arrangement, such a concise distinctness of illustration, nor such a dignified simplicity of style, as is requisite in a genuine history; on which accounts, as well as their greater brevity, the power of producing such works is brought within the reach of a greater number of men. To render these, however, either intelligible or interesting, there are many particulars which every writer of such dissertations ought to know, and of which, if his readers be not informed, he must often seem to talk in a very incomprehensible manner.

The ordinary class of historians generally make a great parade of the authorities on which their narratives are founded: but nothing is more fallacious than authorities; nor does any thing require a more chastened judgment in a writer, than that of appreciating their value. All historical records are faulty in two respects, that may seem to imply a sort of contradic-

tion; they are, universally, at the same time both redundant and deficient. An immensity of facts that we ought to know are left in total obscurity, while many others are recorded with all the precision imaginable, that are evidently unfounded or exaggerated. A record which has either been founded on misconception of the writer, or misrepresented by the reporter, although it should have been most faithfully preserved for thousands of years, comes not one jot nearer the truth at the end of that period than it was at the moment it was written: neither does it follow, that because transactions have not been recorded, the business of human life has been at a stand during those periods. We know, on the contrary, that the course of human affairs must go forward much in the same way where there are no historians to record the incidents that daily occur, as where there are many; and that men in all ages act nearly after the same manner as other men under similar circumstances have done before them. It is upon this principle, as a sure foundation, that the judicious historian can alone rear a superstructure that will deserve to be respected: and, as the mathematician can with the utmost certainty, from a little that is known, ascertain the precise amount of many unknown quantities, so can the historical investigator derive a moral certainty of many things that are altogether unknown, in as far as respects recorded authorities, from a very few facts that have been incidentally preserved.

Thus, for example: let it be admitted, that at a certain period of time there existed in a particular part of Asia a city that was called Nineveh; that this

city was of such extent that it contained not less than fourscore thousand souls who knew not their right hand from their left; and supposing that there was no other record existing respecting the country in which it stood, but this single fact,—what impression, I ask, would the knowledge of it make upon the mind of a judicious investigator; and what conclusions must he unavoidably deduce from it, respecting the state of the country in which that city was situated?

In the first place he would say, that as a town of such magnitude could not be reared at once, it must belong to some body of men who had existed as a society for a considerable period of time. They must, in the second place, have been long in a civilized state; for without a considerable degree of civilization such a body of men could not subsist together. They must have made a considerable progress in the arts; for without arts such a city could not have been constructed. They must be subjected to some regular form of government, laws must have been promulgated among them, and justice administered; for without these necessary restraints, such a vast body of men could never have been brought to co-operate together so as to promote their mutual safety and well-being. The country around must be full of people, and agriculture must have been there practised with no inconsiderable degree of skill and address, otherwise such a numerous people in the town could never have been supplied with the means of subsistence. Manufactures must have made a considerable progress among them; for alike in the country and the town the people must be provided with necessary clothing, imple-

ments of labour, and tools for carrying on the various operations in which individuals were respectively engaged. They must have been possessed of money to serve as a medium for facilitating the exchange of commodities; for without such a medium it would have been impossible to supply the necessities of such a multitude of people, and so to apportion it as exactly to suit the wants of each individual respectively. They must have been acquainted with merchandising, markets must have been established in particular places and at particular times, and shops opened in which small articles could be sold; otherwise public order would have been deranged, and a regular distribution of provisions and necessaries could never have been made. In that country public roads must have been made and kept in good repair; for had these been wanting provisions from the country could never have been obtained in such abundance as to supply the demands of so numerous a people: beasts of burden, or carriages of some sort, must also have there abounded. They must have had soldiers for their defence, with generals and inferior officers to command them; magistrates also, judges, and people having authority in various districts in a subordinate capacity. And all these things are to be considered, not as matters merely of probability, but certainty; for unless these things and many others had existed, the city could never have attained to any thing like the magnitude stated. Thus does a single fact, clearly proved, necessarily establish a multitude of others; and, by the recording of it alone, operates upon the intelligent mind like an irradiation of light which im-

mediately lays open to view a multiplicity of interesting objects thickly spread over the surface of a smiling country, which, but for that circumstance, might have been buried in eternal night.

Now let us farther suppose, that, after the existence of such a city was universally admitted as fully proved, a certain record should be discovered, which stated that in the country where such city stood, there was no sort of regular government; that the people lived in a state of anarchy and misrule; that they were a set of savage barbarians, ignorant alike of arts, of agriculture, and of commerce. Here would be an authority which the mere *compilers* of what we call history would copy with the most scrupulous fidelity one after another to the hundredth generation; quoting with great parade, at the foot of the page, the name of the author from whom they had borrowed it, and in whose *judicious* pages it had been preserved perhaps for thousands of years, as well as in those of his copyists, many of whom, by amplifying upon that text, have reared upon it some of those *sage* remarks with which their pages are so liberally filled. Having done this, they rest satisfied that they have performed the office of an historian with the most laudable fidelity, though they have thus lent their aid to pervert, as far as they were able, the truth of all history, by gravely recording as fact what one moment's reflection might have satisfied them it was impossible could be true.

Nor is it in regard to circumstances of this kind only that the judgment of the historian ought to be exercised in scrutinizing his authorities. Wherever

a body of men are represented as having acted for a continuance of time after a manner that has far transcended whatever has been known to take place among mankind within the records of certain history, there is sufficient reason for rejecting all such accounts as fictitious. When Herodotus records with great precision the sublime virtues of the Egyptian priests, and represents them as invariably reprehending their princes, controlling them while in the zenith of their power, and afterwards forming a jury to judge of them after death, invariably pronouncing sentence of approbation or condemnation upon them with the strictest justice and most inflexible integrity, we can forgive the father of history for carrying a little too far his veneration for a set of men who had treated himself with such a kind partiality, so as to believe upon their word things which, under other circumstances, might have appeared incredible even to himself: but this apology can never be extended to those numerous compilers who have copied it from him, and embellished the story each after his own manner. So also, when the early writers of our own nation, with a view, in all likelihood, to add stability to a system that they wished to preserve, represent the order of druids as possessing every angelic (not human) perfection; when they exhibit them as exercising with the most consummate wisdom in every case the three-fold office of prophet, priest, and king; when they hold them up to view as invested with the most unbounded power, and at the same time as invariably exerting that power, like the supreme Being, for no other purpose than that of promoting the wel-

fare of all their people;—we well know, that such transcendant virtue so far exceeds the imperfect powers of human nature, as to deserve to be viewed in no other light than an ingenious fable, invented for the purpose of a mirror, held up to those in power, to represent to them what they ought to endeavour to do if they could attain it; and that it ought never to be considered in the light of an historical fact deserving of credit.

I state these circumstances merely as illustrative, to show that by a judicious discrimination truth may be often with certainty obtained by the aid of a few facts incidentally preserved, where the thread of narrative-records proves extremely defective; and that, on the other hand, it may sometimes happen, that where recorded authorities are very full and circumstantial, these may tend only to disguise the truth that might have otherwise been obvious, or altogether pervert it. Those persons, therefore, are alone fitted to enter upon historical investigations, who are qualified to give due weight to necessary truths, though they be not expressly recorded, and who do not suffer themselves to be embarrassed by absurdities, though supported by the most ancient records.

It would be fortunate for the investigator, if in every case an equal number of consequences could with as much certainty be deduced from a single fact as in the instance above stated; but this is far from being practicable. Many of the most interesting incidents that occur in the history of past events have been influenced by the peculiar energies of the mind of some individual person; and, as these energies are, for the

most part, disguised under plausible coverings, to conceal the real views of the parties chiefly concerned in public transactions, it is only by accident, and in respect to trivial circumstances when the parties are off their guard, that the real character of the person can be discovered: but how few are the men who, from those transient glimpses of character that sometimes are suffered to escape unawares in regard to the most trivial circumstances, can form a decisive idea of that character, and can with precision comprehend the manner in which it would operate under all the variety of circumstances that can possibly occur! It is such men however, and only such, that can form a just estimate of the operations of those persons who have become conspicuous on this globe in past times, and appreciate the principles upon which they acted. But unless the writer understands these things himself, it is very obvious that he can never so construct a narrative as to convey a true idea of them to his readers. Thus, white may by him be represented as black, and the most wicked enterprises that the heart of man could contrive, or the most foolish attempt, may be portrayed as the purest emanations of angelic beneficence, or superlative wisdom. A Shakespeare could take a discriminative view of the soul of man if but partially seen through the slightest chink that might chance to be left, were it but for one moment uncovered by the most impenetrable disguise: by him therefore, and by such as him alone, could such disguises be stripped off, and the actions of such men represented in their naked truth, without either diminution or exaggeration. It is on this consideration

chiefly that I consider such a scrutinizing genius as Shakespeare so peculiarly calculated for developing historical facts, and for delineating them with that truth, simplicity, and energy, which alone can entitle a work to the dignified name of history.

But, however difficult it may be to delineate with truth and precision the characteristic tendencies of the actions of such personages as have made a conspicuous figure on the theatre of human affairs, it is not in this circumstance, if we are to judge from what we have seen attempted, that the chief difficulty in constructing an historical narrative consists. It has unfortunately been the case, that from the earliest notices of the affairs of this world recorded in profane history, the writers have directed their principal attention to the rulers and governors and great men of the earth, while the circumstances that tended to accelerate or retard the prosperity of the people, or to augment or diminish their internal enjoyments, have been entirely disregarded. Hence it is, that our chronicles (for histories they ought not to be called) are filled with victories and disasters; with wars and destructive ravages; with the annihilation of empires, and the extension of kingdoms; with the deaths of princes, the destruction of cities, the overthrow of the mighty, and the disasters of those who have for a time rendered themselves conspicuous among the nations: forgetting that such a history of man is precisely like what a physical history of our globe would be, which should take notice of nothing but thunder and volcanoes, lightning and earthquakes, whirlwinds and pestilential vapours, hail, frost, snow, and portentous

meteors, the ravages of locusts, the horrors of famine, and the frightful devastations of pestilence; while the more permanent influence of fostering dews and refreshing breezes were disregarded, the vivifying emanations of the sun, the fertilizing refreshment of rain, and the cheering effects that result from the ever-varying combinations of these influences on the temperament and general prolificacy of this globe. We ought never to forget, that though an eruption of Vesuvius may once perhaps in the course of a thousand years bury a city in ruins, or destroy the productions of the fields for some distance around, in which only a small proportion of the produce or the people are destroyed; yet, if the amenity of the climate returns, the fertility of the country remain nearly as before, the people who are left, after suffering a temporary distress, prepare for themselves new habitations, and in consequence of the all-healing power of time, and the unceasing operations of nature, these mighty disasters, which alarm the nations and make a conspicuous figure in history for thousands of years, are quickly forgotten at home. Cheerfulness and festivity soon resume their wonted influence; plenty produces its necessary consequences; marriages are celebrated with their wonted joy; and that desolating event has been totally obliterated from the memory of the natives of the place for many hundreds of years together; while it still continues to be considered by distant nations as the principal incident that marks the character of the country. Those tremendous events, therefore, which so much attract the notice of writers, may be considered, in general, in as far as they affect the

real interests of nations, as mere parentheses, as things of great indifference upon the whole, and which might be totally lost sight of without materially affecting the true account of the actual state of the country. Though they spread destruction around for the moment, yet they are frequently, in the moral as in the physical world, ultimately productive of salutary influences. The island of Antigua was, not many years ago, saved from destruction by the tremendous intervention of a hurricane (see Vol. I. Natural-history, page 14). It is from the eruptions of Vesuvius that the fields around the base of that mountain derive their noted fertility; and the British constitution itself, in like manner, owes its unrivalled perfection chiefly to those frequent usurpations which for so many years together inundated the nation with the blood of its own people. Hence it is, that those who form their idea of the character of nations from the lives of its princes alone, the state of their wars, their conquests, and their revolutions, must ever form a very inadequate or erroneous judgment. These things pass over like the destructive operations of a whirlwind or an earthquake; their effects are local and temporary: they may disturb a few, but, if the general operations of government be steady and benign, they are scarcely felt among the people. It is other and lesser changes which affect them. To continue our metaphor, it is the state of the dews, the sunshine, the refreshing rain, and the progress of vegetation under their benign influences, that it chiefly imports us to know, not those destructive eruptions which produce a temporary derangement. It is these changes precisely which have been unfor-

tunately overlooked by those who have pretended to transmit to futurity an account of human affairs, and which now can only be incidentally collected from casual touches that have been by accident preserved in ballads, and songs, and occasional effusions, that never were intended to form a part of the historical records of any nation. To search for these now is an arduous task, and little accords with that rapidity of conception which forms a distinguishing characteristic of genius. Long must it be, therefore, before these disregarded incidents can be dug out from among the heaps of rubbish in which they have been buried, and so disposed as to bring them within the reach of those who know how to avail themselves of such materials; and longer still must it be before men shall arise who are capable of illustrating the history of nations by means of the facts that shall be thus brought to light. Long, very long must it be before the world can hope to see such a performance; for much have we still to learn before such a thing can be attempted.

[*To be continued.*]

Slight notices of General Washington, late President of the United States of America.

What doth the Lord thy God require of thee, O man, but to do justly, to love mercy, and to walk humbly with thy God?

HAD the writer of this paper been possessed of talents sufficient to pourtray in its just colours the character of this much respected man, he would have been among the foremost in performing such an act of justice to departed merit; but he will not degrade,

by a nerveless attempt, that which he wishes to exalt. His utmost aim, therefore, on this occasion, is to bring forward a few traits of private character that may serve to illustrate those important public transactions in which general Washington for many years bore so conspicuous a part; for it never should be forgotten, that it is not so much the action itself that constitutes the merit of a deed, as the motive from which it proceeds. Brutal courage may give birth to acts of heroic valour, and insidious cunning may bring forward plans that indicate superlative talents; but it is rectitude of mind alone that can ennoble the hero, and elevate him to that superiority among men which should entitle him to the respectful homage of future ages. It is this consideration that stimulates the writer to step forward on the present occasion; for he well knows, that wherever great reverence is due, malevolence will be busy with degrading insinuations; which, as they must in this instance be entirely of a private nature, and respecting which the world in general cannot have *immediate* means of judging, will be best counteracted by bringing into view some private transactions of the closet, that were never intended to see the light; and in which the heart was allowed to indulge its own propensities without any earthly inducement to make it deviate in the smallest degree from these its native impulses.

To those who judge of characters by the standard that is exhibited of common men in their progress through life, it must, no doubt, appear a very singular phenomenon, that a friendly intercourse by letter, should be carried on for many years between a

nameless individual in North Britain, and a man who held so elevated a station, with such exalted respectability among all nations, as general Washington; and all this without the smallest approximation to political intrigue on either side. Yet so it was: and as this incident, however trifling in itself, serves to mark the real character of the man with such accurate precision as “ignorance cannot misunderstand, nor malevolence misrepresent,” it is proper that the circumstances which gave rise to it should be explained with the most undeviating accuracy.

Above a dozen years ago, the writer of this article experienced family losses, which, though of a kind whereto all men are liable, and which are by many accounted among the most trivial occurrences, yet will ever be felt by some as the severest dispensations that Providence can inflict upon man during his pilgrimage through life. His active energies having been thus deeply depressed for a time, many months were allowed to run on, with scarcely any discrimination to mark time in its progress. At last, however, a due sense of the criminality of such a total dereliction of the duties which his situation in society demanded of him, began to steal across his mind. This induced a feeble effort toward a sort of exertion; but, like Noah's dove on his first survey, he could find no object in nature sufficient to attract his notice, and was forced to return to the place whence he came. At an after period he conceived a faint idea, which was not, even at first, so unpromising as to prevent him from recurring to it; and the more he considered it, the more inviting it appeared. Like Don Quixote

in his chamber, he cherished the hope, that by proper exertions he might perhaps become the means of being in some measure serviceable to mankind, by publishing a journal, that should have for its object the general diffusion of useful knowledge, the weakening of prejudices among men, and the uniting them more closely in the bands of amity and good will. This idea, which was soothing to a mind weakened by distress, and weaned from the pleasures of the world, was long cherished in secret; and at last, without adverting to the weakness of the power by which these things were to be effected, after the lapse of more than two years, a prospectus of the work (to be called *The Bee*) was drawn up, and circulated as widely as the contracted sphere in which the author moved would admit. A few copies of this prospectus were, by the obliging intervention of the earl of Buchan, transmitted to general Washington, who received them with a kind partiality, that nothing but the most genuine benignity on his part could inspire. The President of the United States of America became from that moment a warm and disinterested patroniser of the intended work. He caused it to be advertised in the American news-papers at his own expence; and at his recommendation the author had the honour of being admitted a member of that very respectable body of men who constitute the philosophical society of Philadelphia; the news of which honour Mr. Washington communicated with his own hand, accompanied by the most obliging expressions of kindness.

The writer has on many other occasions had reason

to feel, that, instead of malevolence, this world abounds in men whose hearts are overflowing with good will; and who, if they can but be convinced of the uprightness of the intention of any one, are ever disposed to receive with the most tender indulgence the efforts, however weak, that may be made to effect any useful purpose; but never did he experience it to such a degree as on this occasion; and he should think himself culpable did he attempt to conceal or to palliate it. Every one must be aware, in cases of this sort, that however doubtful the propriety of such approbation may be in as far as it respects the party obliged, there can be nothing less equivocal in as far as it respects the party who confers the obligation. It is the nature of the human mind to judge of others by its own perceptions of things. No man ever formed an exalted idea of perfection in the human character, who did not feel in his own mind emotions of a similar kind of exaltation. Every thing viewed thus takes a tint from the internal feelings of the person who views it. The character we form of the Deity himself is, in this way, debased by the imperfections of man; and every one knows, that in this way hearts glowing with the most sublime sensations are frequently wrung with anguish, on being forced to discern, that the exalted qualities which they thought they perceived in another, had been only the qualities of their own mind, which they mistook for spontaneous emanations from a person by whom the influence of such perceptions, if at all felt, were only experienced in the faintest degree. The kind partiality then of this great man upon the present occa-

sion, affords the most decisive proof of the innate existence in his mind of those fine sensations which tended to elevate it far above the level of those of ordinary men.

The correspondence thus begun suffered no interruption at any future period; and it is probable, that that great man had received the answer to his last letter (if indeed it had at all reached him) only a few days before his death; for the same ship that brought the news to this country of general Washington's death, also brought intelligence that the parcel which contained that letter had just reached Philadelphia. Nor was there ever any abatement in that kind confidence which he had all along reposed in the man whom he deigned to honour, or in that respectful deference in his correspondent, which the gradual display of his amiable character tended so strongly to augment. The correspondence was entirely of a private and confidential nature; nor did any thing of a political kind ever interrupt its purer tendencies. The only letter in which any thing of that sort is glanced at, is one which will be laid before the reader in the sequel of this memoir. It behoves the writer, however, to say, that soon after the commencement of this correspondence the General expressed, with a feeling energy, his hope of being able at some future period to retire from the theatre of public life: and there was scarcely a letter in which this idea did not recur. There can be no doubt, therefore, that it had been all along the secret wish of his heart. It did, indeed, appear so evident from the whole tenor of his letters, that he submitted to discharge the functions

of the exalted place he held merely as a *duty* that he thought himself bound to discharge, though in the doing of it he did violence to his inclination, that the secret wish of his correspondent's heart was, that he might be permitted to indulge his inclination to spend the remainder of his days in the peaceful tranquillity of rural retirement; which was as clearly expressed as the deference due on his part to the General would permit: nor has he at this moment a doubt but it was the coincidence of opinion on this his favourite topic, that was the chief cause of that kind partiality with which Mr. Washington received every little exertion that came from his humble correspondent. The public will recollect the patience with which the President waited till a proper opportunity occurred, and with what discriminating promptitude he embraced that opportunity, when he saw that, without endangering the public tranquillity, he could be permitted to indulge the natural bent of his mind by retiring. This event, when thus explained, will long continue to constitute a distinguished epoch in the history of man; for there is, perhaps, no other instance to be found, of private inclination being so long suppressed without any mark of the petulance of affectation, or of power being deliberately resigned without the smallest influence of peevishness or any other wayward affection leading thereto. After this event had taken place, he thus writes from Mount Vernon, April 7, 1797. "I am once more seated
" under my own vine and fig-tree, and hope to spend
" the remainder of my days, which in the ordinary
" course of things (being now in my sixty-sixth year)

“ cannot be many, in peaceful retirement; making
“ political pursuits yield to the more rational amuse-
“ ment of cultivating the earth.” And in October
of the same year, he recurs to the subject in the fol-
lowing terms. “ Freed, as I now am, from the toils,
“ the cares, and responsibility of public occupations,
“ and engaged in rural and agricultural pursuits, I
“ hope (aided by the recollection of having contri-
“ buted my best endeavours to promote the happiness
“ of that country which gave me and my ancestors
“ birth), to glide peaceably and gently on in the
“ shades of retirement, and with good will to all men,
“ until *my time* shall be no more. In doing this, I
“ promise myself more real enjoyment than in all the
“ bustling with which I have been occupied for up-
“ wards of forty years of my life, which, as the wise
“ man says, has been little more than *vanity and*
“ *vexation.*” Such was the general train of ideas
that prevailed throughout the whole of the letters of
this truly respectable man; not even excepting that one
which the writer hopes to be excused for now laying
before the public, although in it the General touches
upon political subjects with a degree of animation that
certainly was very unusual with him; and that strongly
marks the indignant feeling which the attempt, as he
conceived it to be, to destroy the independence of the
nation, had excited in his bosom. As this letter was
intercepted by the French, it may not be thought very
improbable, considering the person by whom it was
written, that it might have been conveyed to the Di-
rectory of France; upon whose minds, if so, it must
have made a considerable impression, and might here-

after be published in a mutilated state. A duplicate of this letter was sent under a cover containing a few lines which came safe. Both these letters and all the others were written with Mr. Washington's own hand, and are here copied with the most scrupulous accuracy, even to the *dates* as marked by himself. A word or two which had been omitted in transcribing have been supplied by conjecture, and put between brackets []. For the view with which the letter is printed, it would have been obviously improper to have omitted any part of it. Let this serve as an apology for such parts of it as peculiarly respect the person to whom it was addressed.

Dr. James Anderson, in or near London.

“ ESTEEMED SIR,

Philadelphia, Dec. 10, 1798.

“ HEARING that the ship
 “ (Suffolk) by which the inclosed letter was sent was
 “ captured by the French, who never restore any of
 “ mine, I do, to avoid the imputation of inattention
 “ to your favours, and the correspondence with which
 “ you honour me, send a duplicate, being, with very
 “ great esteem and regard, Sir,

“ Your most obedient and

“ obliged humble servant,

“ G. WASHINGTON.”

(Duplicate.)

“ ESTEEMED SIR,

Mount Vernon, 25 July, 1798.

“ YOUR favour of the 8th
 “ of February came safe, and would have received an
 “ earlier acknowledgment if any thing had sooner oc-
 “ curred worthy of communication.

“ I hope you have not only got relieved of the fever
 “ from which you were then recovering, but of the
 “ languor with which it had affected you, and that you
 “ are now engaged in the literary pursuit of which you
 “ gave the outlines; and which, with your pen and ar-
 “ rangement of the subjects, must be curious, enter-
 “ taining, and instructive. Thus persuaded, if you
 “ propose to carry the work on by way of subscription,
 “ it would give me pleasure to be numbered among
 “ the subscribers.

“ I little imagined when I took my last leave of the
 “ walks of public life, and retired to the shades of my vine
 “ and fig-tree, that any event would arise *in my day* that
 “ would bring me again on a public theatre: but the
 “ unjust, ambitious, and intoxicated conduct of France
 “ towards these united states has been, and continues
 “ to be such, that they must be opposed by a firm and
 “ manly resistance, or we shall not only hazard the
 “ subjugation of our government, but the indepen-
 “ dence of our nation also; both being evidently
 “ struck at by a lawless, domineering power, who re-
 “ spects no rights, and is restrained by no treaties
 “ when it is found inconvenient to observe them.

“ Thus situated—sustaining daily injuries, even in-
 “ dignities, with a patient forbearance, from a sincere
 “ desire to live in peace and harmony with all the
 “ world, the French directory, mistaking the motives
 “ and the American character; and supposing that the
 “ *people* of this country were divided, and would give
 “ countenance to their nefarious measures, have pro-
 “ ceeded to exact loans (or, in other words, contribu-
 “ tions), and to threaten us, in case of non-compliance

“ with their wild, unfounded, and incoherent com-
“ plaints, that we should share the fate of Venice and
“ other Italian states.

“ This has roused the people from their slumbers,
“ and filled their minds with indignation from one
“ extremity to the other of the union; and I trust, if
“ they should attempt to carry their threats into effect,
“ and invade our territorial as they have done our
“ commercial rights, they will meet a spirit that will
“ give them more trouble than they are aware of in
“ the citizens of these states.

“ When every thing sacred and dear to free-men is
“ thus threatened, I could not, consistent with the
“ principles which have actuated me through life, re-
“ main an idle spectator, and refuse to obey the call of
“ my country to head its armies for *defence*; and
“ therefore have pledged myself to come forward
“ whenever the exigency shall require it.

“ With what sensations, at my time of life (now
“ turned of sixty-six), without ambition or interest to
“ stimulate me thereto, I shall relinquish the peaceful
“ walks to which I had retired, and in the shades of
“ which I had fondly hoped to have spent the rem-
“ nant of a life worn down with cares in contempla-
“ tion on the past, and in [the enjoyment of] scenes
“ present and to come of rural growth, let others, and
“ especially those who are best acquainted with my
“ ways of thinking, decide; while I, believing that
“ man was not designed by Providence to live for
“ himself alone, shall prepare for the worst that can
“ happen.

“ The gardener you were so obliging as to send me
“ continues to conduct himself extremely well. He

“ is industrious, sober, and orderly, and understands
“ his business, In short, I never had a hired servant
“ that pleased me better; and what adds to the satis-
“ faction is, that he himself is content; having de-
“ clared that he never was happier.

“ My best wishes always attend you; and with great
“ esteem and regard I am, Sir,

“ Your most obedient and obliged,

“ humble servant,

“ G. WASHINGTON.”

Reflections suggested by the above.

To a mind susceptible of the impressions of true religion What are the allurements of glory and of power? The pomp of royalty it contemplates as the scintillations of the glow-worm, which only serve to mark the place of an insect for a few moments, that must soon be extinguished for ever. As to human power, What is its amount? The most absolute monarch upon earth, when surrounded by those minions ever ready to execute his will, Can he save his greatest favourite from the languor of disease, the decrepitude of age, the anguish of disappointed hope, or the terrors of approaching dissolution? His efforts in this case are equally unavailing with those of the meanest of the human race. His power then is only mighty to do mischief. He can destroy a city; lay a whole country desolate, or can involve, perhaps, a great part of the universe in one indiscriminate ruin. And is this the glorious privilege which is the object of the general cupidity of mankind? It is indeed the whole. Yet the beneficent mind, who views it at a distance, cannot be easily brought to draw this just conclusion. It

rears up plans of ideal benignity, which it hopes the possession of human power would enable it to realise. In raising these ideal fabrics of perfection, it pursues the path which nature chalked out as the true road to happiness and peace; and from which no human being can ever be excluded. They are all alike allowed to contemplate it in prospect, and all alike are prohibited from being able to reach it in reality. The good that the monarch desireth to perform, like that of the abject prisoner in the dungeon, are nearly alike resolvable into an ineffectual wish. The prejudices, the passions, the imperfections, and the vices, of those he wishes to serve, for ever oppose the beneficent views of the most powerful among men; but, above all, the weaknesses of his own heart, the errors of his judgment, and the imperfections of his understanding, throw bars perpetually in his way that no exertions on his part can overcome. Owing to these causes the good that he wished to do he finds, when too late, has on many occasions been productive of evils he could not foresee, and which above all things he wished to shun. It is then that he feels, with a poignancy of regret, the justness of the sentence of Solomon, that all the enjoyments he hoped to derive from this source end only in disappointment. Incessantly urged on, however, by the current of events, while in that high station, to act, where his own judgment would induce him to deliberate, he finds that it is productive only of vexation of spirit. Can any thing be more natural than for such a man to look forward with complacency to that placid serenity which can alone be enjoyed in domestic retirement, while surrounded by those whom the heart wisheth to cherish? Where undisturbed

he can be permitted to look forward to that better country where error and disappointments are unknown; where hope shall be completed in fruition; where the wicked cease from troubling, and the weary are at rest? Such were evidently the sensations of the man who is the object of our present contemplation. Can we wonder then that his progress through life was dignified, and his latter end tranquillity and peace?

Index Indicatorius.

Ignotus states, with great modesty, a singular fact in natural-history, which he imagines will not gain credit with the public, and which, as not having been an eye-witness to it himself, he only gives upon the authority of another person, in whose veracity he has every reason to put entire confidence. It is this. A wedder sheep belonging to Mr. Goodhale, in the parish of Galby, about six or seven miles east of Leicester, took a fancy to a motherless lamb last spring, and nursed it as a mother during the season: nor is this, he says, the first instance of the kind that has happened on that farm. A fact of this kind is indeed so different from the ordinary course of nature, that it should not be admitted on slight foundation; but neither is it so contrary to it as to be, on that ground, absolutely rejected as a fable without farther examination; for there are upon record many very well authenticated facts somewhat of a similar kind. Among these I am at present able to recollect the following instances that have occurred to me in the course of reading. *Scholzius*, a celebrated physician in Prussia, says, that he himself knew a student of

physic when he was at college, from whose left breast issued milk every day for nearly a whole year without interruption. *Bartholin* mentions a bitch who had never had young which yielded milk in abundance. *Bodin* relates a very extraordinary history of an old woman, long after she was past child-bearing, who, having presented her breast to the child of her daughter who had died, with a view to still it, was surprised to find, that in consequence of its sucking it brought at last so much milk as to enable her to suckle it. *Louis Bourgeois* speaks also of a woman of fifty years of age whose breasts yielded milk, although she never had had a child; and *Henry de Heer* makes mention of another woman whose breasts yielded milk in abundance to suckle a child, though she never had been in a situation to become a mother. It is not women alone, says *Bettus*, who have the faculty of yielding milk, men are also sometimes endowed with it, from a certain conformation of the organs: in fact, both sexes have the same kind of organs for secreting milk, though in the ordinary course of nature it is the female alone who is in a situation to have these organs brought into activity, though they do not seem to be incapable of being excited; but this is sometimes the case. *Bartholin*, says he, speaks of a man whose breasts yielded milk in such abundance, that for curiosity's sake they made some cheese from it. *San-torelli* says, that he knew a man in Calabria, who, after the death of his wife, not being able to pay for a nurse, suckled his child by his own proper milk; and another fact of the same kind is mentioned by *Gaspard de Reis*. There seems, indeed, reason to believe, that among animals of the mammalia class,

suction at the breast, continued for a long-enough period, will in general bring milk into these organs, whether of male or female. Milk, indeed, seems to be a secretion so natural to this class of animals, that it sometimes shows itself without any excitation for that purpose, under circumstances very different from those in which it flows in the common course of nature. Some of these instances occur above; many others might be added. *Arist. Hist. An. b. 1, c. 12, & l. 3, c. 20*, gives instances of this sort. *Andr. du Laurent. Anat. l. 2, c. 2*, particularises the following cases. "I myself," says he, "can witness, that in pressing the breasts of a young man, a relation of my own, there came forth milk in abundance, and which, flowing of itself, used to wet his shirt in that place. Such instances as this, he adds, are very rare, and I recollect at present no other author who mentions it except *Cordon lib. de subt.* who relates that he had found milk in the breasts of an infant of one month old, which flowed abundantly from the nipples, and *Camerarius*, who speaks of a girl of three months old whose breasts were very prominent, and yielded milk. I have seen myself, he adds, a young girl of a distinguished family in this city, who, when only fifteen days old, yielded from her breasts a white liquor absolutely resembling milk, and this continued to flow for the space of eight days. There are even still more extraordinary instances of the production of milk than any of these. In an early number of the *Phil. Trans.* mention is made of a case in which milk flowed from a vein in the place of blood; and *Mr. Bourdon*, physician in Cambray, *Journal des scavons*, c. 84, mentions the case of a girl of twenty-

one years of age, who yielded as much milk from some small pustules in the upper part of her left thigh as a nurse would have done from her breasts. This milk produced cream, cheese, and whey, and was, in all respects, like other milk, unless a perceptible degree of greater acrimony. It flowed in such abundance that they were obliged to stop it with bandages and a comprefs, lest it should have weakened her too much."

These instances sufficiently show, that the case stated by my correspondent, though it must be accounted rare, need neither be deemed miraculous nor incredible.

A respectable correspondent takes notice that *Aristotle* and *Aelian* have both mentioned the polypus, as also Plutarch in his treatise upon the distinction between a friend and a flatterer, and elsewhere, has mentioned it, and quotes the following lines of Ovid, from a note on Mr. Northmore's valuable translation of the above-mentioned treatise mentioning the same object.

At contra scopulis crinati corpore regnis
Polypus hæret, et hic eludit retia fraude,
Et sub lege loci sumit mutatque coloram,
Semper ei similis quem contigit.

Whoever examines these descriptions will perceive that they do not apply to the polypus of the moderns. It would be too knotty a subject for our amusements to try to ascertain what animal they meant to indicate by that name, or other things of that sort.

Thanks to the obliging correspondent who informs, that in his tour through Italy he found a kind of sheep, about midway between Naples and Rome, whose teeth

were tinged of a golden colour, and was informed that a similar thing occurred in the island of Cephalonia. The same phenomenon sometimes occurs in some of the northern parts of this island, as has been remarked by Bœtheus and Pennant. This is probably a pyrituous incrustation, which may occur in many places.

Agricola is respectfully informed that Mr. Forsyth is going forward with his work as fast as circumstances will permit, though much more slowly than the friends of useful improvements could wish. The pamphlet has been long out of print.

To the Readers of this Work.

THE readers of this work are respectfully informed, that the whole of the present volume has been printed on paper that cost at least *twenty*, and the last three numbers no less than *fifty* per cent. above its former price. This enormous advance having been, without a doubt, chiefly occasioned by the destructive speculations of monied men, the Editor was in hopes that the law might have been made to reach them, and thus to protect the public from their gripe even before this time; in which hope he delayed to follow the example of most publishers, who in general have found it necessary to raise the price of a shilling pamphlet to eighteen pence. As there does not however appear to be an *immediate* prospect of any fall (though rags have dropped in price considerably) he finds himself reluctantly constrained to lay an additional sixpence upon each number of the common, and one shilling on the fine copies of this work, which will commence with the XIII number. But he pledges himself, that as soon as the paper shall drop to within *fifteen per cent.* of its former price, he will give an additional sheet with each number, as he finds many of his readers are desirous to have such an augmentation; and this, he thinks, must take place before it be long.

He cannot omit embracing this opportunity of expressing his warmest wish that this and similar instances of culpable engrossing, so destructive to the well being of society, may attract the strongest attention of parliament, of judges, and the public. A commanding capital in trade,

When it is honestly applied for the purposes of a legitimate commerce, is, without a doubt, of great public utility; but, when such capitals are employed in speculations tending to enhance the price of the common necessaries of life, they became in the highest degree pernicious: nor does he know any kind of injustice that can be compared with it; because its influence extends much wider than any other. A robber or a highwayman only pillages a few individuals; but a person of such a description lays a whole country under *contribution*; not, like *Bonaparte*, for public uses, but merely for the purpose of private emolument. Justly then are such persons held in execration at all times; but in a season of scarcity like the present, when every thing that deranges the public economy, and deprives the industrious labourer of the honest means of earning a subsistence for himself and family is productive of such extensive misery, it becomes most eminently oppressive; and therefore its operations deserve to be watched by all orders of persons with a double degree of attention, that the offenders may not be suffered to escape justice. Nor is this duty confined to legislators, judges, and magistrates alone, but it extends to every individual in his private capacity: for it ought never to be forgotten, that we in vain do call upon our legislators for wise laws, unless the facts on which these laws should be grounded are laid before them. In vain do we look up to judges or magistrates for enforcing the most salutary laws, unless the facts which tend to infringe these laws are faithfully presented to them; so that the power of the law in a great measure depends upon the exertions of individuals to bring forward such facts as come within their own individual knowledge respectively: nor should any one shrink back from such a disclosure from an idea of the invidiousness of the office. It is a *duty* from which he can by no means withdraw himself without being guilty of a crime of the deepest dye. It is painful to the judge, no doubt, to decree the necessary punishment to criminals, but his duty requires him to do it with a firm and steady hand. In like manner every individual who knowing facts of this nature allows them to pass unnoticed, becomes a participator in the crime: he becomes, in fact, a participator in treason, treason of the deepest dye; treason against the public, against industry and helpless innocence. Let us not then complain of legislators, of judges, or magistrates, for allowing such crimes to pass unpunished, while we ourselves individually relinquish the post that is assigned to us, by culpably leaving these magistrates unsupported where it became our duty to aid them. I therefore call upon every individual, not to look to others, but himself in the first place, and desire him fairly and openly to state such facts

tending to prove criminal ingrossing of any kind, as fall within his own knowledge, and when he has thus discharged his own duty, and not before, he is entitled to call upon others to do the same.

The crime of engrossing has obtained much opprobrium and popular abuse in this country: but it would seem too little serious discussion, for never was the evil perhaps carried to such a height as at the present moment; and, if it be not now opposed with the most steady fortitude, there is reason to fear that other monied men, seeing the immense success of such speculations, may be induced to fall into that line, and thus effectually derange the whole economy of the state, by involving the industrious poor in misery and distress, which no exertions of theirs can ever countervail; by exalting a few to such a height of wealth as to enable them to pollute the streams of justice, and thus give rise to all those disorders which dissoluteness of morals, inordinate ambition, and immoderate wealth so necessarily engender. It is an evil, therefore, of the most serious kind, which it behoves every person, whatever his station or situation in life may be, to use every exertion in his power to repress it: not in one line, but in every line of business in which it can be discovered.

Contemplating the nature of this crime, I think I can perceive one mode of thinking which prevails in this country in respect to the distribution of justice, which, if not adverted to, must have a tendency to disarm the law of its terrors where culprits of this nature are brought before a judge. It is a prevailing principle, I think, that runs through all the decisions of law, that where a culprit is brought to trial, the jury have not a right to award a fine by way of *punishment*, but merely by way of *damages*; and that they cannot give an award for a greater sum than to the amount of the damage the prosecutor can instruct that he has sustained. But it is easy to see, that were a principle of this sort to be applied to engrossers, it must give them a great chance of impunity; for, from the nature of their operations, the loss that each individual sustains is small, but it reaches an immense multitude. If ten thousand persons have been damaged to the amount of forty shillings each, and one should prosecute and cast the defender, what would it avail to fine him forty shillings, even if the expences of the prosecution be added to it? He would consider it as nothing, while he was permitted to pocket the remainder of his ill-got wealth. But if a judge or a jury were authorised to take into their view the whole circumstances of the case, and to award a fine as a *punishment*, to the amount perhaps of forty or fifty thousand pounds, where they were satisfied that the gains thus obtained had

amounted to such a sum upon the whole, and would not prove ruinous to the culprit,—with a power, especially in such times as the present, to apply that fine towards purchasing food for the poor, it would operate as a check that would have a powerful tendency to repress such destructive speculations. That something of this kind is wanted, no one who reflects seriously upon the subject can deny; but I am too little skilled in matters of this kind to be able to prescribe the mode in which it could be properly effected. The crime, when the *extent* of it is contemplated, may be considered as but yet in its infancy in this kingdom. As new crimes spring up, new laws become necessary to repress them. The swindling act is, on this account, but of modern date: the evil of which I complain, in the present state of this country, threatens to be of much greater prejudice to the nation than swindling; and it will be found to be so, if not very timeously adverted to by those who have the power and the skill to devise a proper mode of repressing it. In calling the attention of the public to this subject at the present time (February 1800) I have discharged, as an individual, the duty that falls upon me respecting it, and I thus record it, that it may remain as a memorial to future times.

As many correspondents have expressed a wish that a greater proportion of this work should be appropriated to agriculture, let them be informed, that when the additional sheet shall be given (which, it is to be hoped, will be very soon) the boundaries of the agricultural department will be extended in a greater proportion than the others. This is as far as the Editor thinks he can be authorised to go, without infringing on the plan held out to the public in his prospectus, which he cannot think he is authorised to do, without a just imputation of having acted unfairly by many who confided in him.

The favour of G. H. N. is come to hand, and shall be transmitted to Madras the first opportunity.

J. W——n is respectfully informed that a private answer shall be sent as soon as the necessary inquiries can be made.

Acknowledgments to other Correspondents deferred for want of room.

END OF THE SECOND VOLUME.

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E R R A T A.

Page 89, line 20, for "Steatopygo," read "Steatopyga."
 ... 111, line 21, for "Stentorea," read "fusca."
 ... 172, line 6 from the bottom, for "temperament," read "temperature."
 ... 185, line 24, for "and not more," read "and more."
 ... 189, line 1, for "climate. Such," read "climate, such."
 ... 205, line 13, for "prescribed," read "proscribed."
 ... 206, line 15, for "crica," read "circa."
 ... 238, line 7, for "water," read "urine."
 ... 248, line 20, for "more," read "most."
 ... 304, line 4 from bottom, for "Inocarpus, Edulis," read "Inocarpus edulis."
 ... 313, line 2 from bottom, for "thus Petrarch," read "thus Dante and Petrarch."
 ... 332, line 27, for "d a b c," read "d a b c."
 ... 344, line 14, for "midge," read "gnat."
 ... 380 and sequel, several times repeated, for "potato," read "potatoe."
 ... 386, running title, for "eradicated," read "extracted."
 ... 397, line 17, for "Caramanis," read "Carmania."
 ... 335, for the diagram, substitute that on the following page.
 ... 468, line 6, in some of the copies, for "dates," read "italics."

P L A T E S.

The Argali, facing page 84.
 Fat-rumped Sheep, page 90.
 Hydra Grisea, page 112.
 Spanish Ram, page 114.
 General view of the Polype, page 176.
 Magnified Cluster and Tufted Polypus, page 178.

The Gooseberry Phalaena and Tenthredo, page 279.
 Portrait of Dr. Anderson, Madras, to front page 38.
 Illustrations of Horse-hoeing, page 347.

Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.

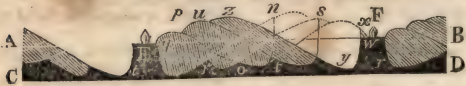


Fig. 5.

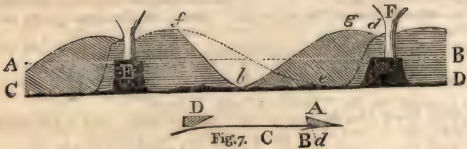


Fig. 6.



The Diagrams in last Number were so badly done, that the above is given in their stead.

Some of the letters are still deranged a little, but it is hoped they will be understood.

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